DRAFT REPORT
July 2015

CITY OF ROANOKE
GREATER ROANOKE TRANSIT COMPANY

DOWNTOWN ROANOKE

Intermodal Transportation Study

wendel

Task 1 – Project Initiation and Rail Patronage Study

Study Goal

The objective of this study is to assist the City of Roanoke and Valley Metro (Greater Roanoke Transit Company, GRTC) in examining the feasibility of a new intermodal transportation facility that supports the re-introduction of passenger rail service to the City.

Several recent developments led to the desire and need for this type of study. One is the announcement that Roanoke will be the next locality to which Amtrak passenger rail service will be extended from Lynchburg, with the goal of starting this service by January of 2017. This is currently the highest priority project for the Virginia Department of Rail and Public Transit (VDRPT). Another important development that brought about a need for this study is Valley Metro will be transitioning its fleet to buses that are 8'- 6" wide, which will have a significant cumulative space impact on the current Campbell Court Transit Station in regard to bus bay sizes and bus movements. In this sense, the current configuration at Campbell court has reached its useful life. The facility may be retrofitted but at a significant cost of time and resources. The proximity of the proposed location of the future passenger rail platform to the existing Valley Metro transit hub at Campbell Court provides an excellent potential opportunity to construct a state of the art intermodal transportation facility in Downtown Roanoke that brings together passenger rail, local bus, regional and/or express bus, inter-city bus, bicycles, shuttle services, taxi and/or other shared ride modes of service.

Project Team and Stakeholders

The stakeholder committee provided project guidance and clarification throughout the course of the study. The stakeholders met regularly to review the work performed by the design team and provide feedback to continue project progression. In addition to the stakeholder group, other city staff members participated in the project dialog including Christopher Morrill, City Manager and Assistant City Managers Sherman Stovall and Brian Townsend.

Committee Members

Chris Chittum, City of Roanoke

Priscilla Cygielnik, City of Roanoke

Phil Schirmer, City of Roanoke

Carl Palmer, Valley Metro

Kevin L. Price, Valley Metro

Neil Sherman, Virginia DRPT

Christina Finch, Roanoke Valley Planning

Chip Badger, Wendel

Sean Beachy, Wendel

Ron Reekes, Wendel

Paul Anderson, AECOM

Bruce Williams, AECOM

Xiaobing Shuai, Chmura Economics

Carolyn Howard, Draper Aden Associates

Sri Nathella, Draper Aden Associates

Gerald Salzman, Desman Associates

William Wuensch, EPR

Brenda Landes, SFCS

The project design team was led by Wendel. The team included the following specialized firms to perform the tasks:

AECOM – Rail Patronage and Ridership

Chmura and Associates – Economic Analysis

Draper Aden and Associates - Civil Infrastructure review and NEPA Preparation

Desman and Associates – Parking Capacity Study

Engineering and Planning Resources – Traffic Engineering Studies

SFCS – Architectural Services

Project Initiation

Immediately upon award of the work, project initiation activities began and project kick-off meeting was scheduled between the Wendel design team and the City, Valley Metro and VDRPT. This meeting provided the foundation of the study effort by defining the project goals and objectives, project team structure, key points of contact and communication for all stakeholders, appropriate communication protocols and an overview of the anticipated study schedule.

Also discussed during the meeting were the multiple platform locations currently under consideration, the City's recent parking study for downtown, the need to quickly initiate the ridership forecast work, the potential framework for a Categorical Exclusion document, possible public input and informational meetings, and the next steps for developing the project space needs through site visits and stakeholder interviews.

Following the meeting there was a site visit to the general location of the train platform, where the City provided an overview of the general discussions occurring with Amtrak, Norfolk Southern (NS), and VDRPT as to siting and Amtrak requirements. Additional discussion was held on Norfolk Ave and the need to preserve as much right-of-way and roadway as feasible.

The meeting minutes for the kick-off meeting are contained in Appendix A of this report.

In addition to programming interviews, project initiation activities included gathering of pertinent existing data, reports and studies, and detailed on-site analysis and observation of the existing Valley

Metro transit operation at the Campbell Court station. The project team also gathered information regarding the existing transportation and utility infrastructure of the study area.

The results of these various project initiation activities form the basis of the contents of this report, and the information gathered and analyzed are included in the section they most appropriately pertain to.

In order to transition from the project initiation phase into the full effort of performing the feasibility study, it was first necessary to produce the ridership forecast. This is because the projected ridership information would assist in defining the project programming and space needs, determining the parking requirements, selecting the preferred site location, identifying the appropriate passenger amenities, and ultimately, informing the concept design for the building and site. It would also be part of the information needed in order to assess and analyze the project's projected economic benefit to the City and surrounding region.

Rail Patronage Study

Model Structure and Parameters

The study was conducted for the City of Roanoke with the participation of the Virginia Department of Rail and Public Transportation (VDRPT). The proposed service would replace the existing Smart Way Connector Bus between Lynchburg and Roanoke, with the bus continuing service from Roanoke to the Blacksburg/Virginia Tech area.

Data collected for this effort included demographic data for the Roanoke Transportation Management Area, including population and employment for years 2010 and 2040, national demographic data including population, employment, and income at the Census Division level for the entire study area for years 2010 and 2013, total ridership for the Washington-Lynchburg Amtrak route for FY13 and FY14, and total ridership for the Smart Way Connector Bus for FY12, FY13, and FY14.

The station ridership was developed using a national intercity rail model developed by AECOM for corridor analysis for Amtrak's Northeast Corridor, Southeast Corridor, Florida, and multiple corridors in the Midwest, calibrated to match the base Amtrak ridership data provided by VDRPT for the Washington-Lynchburg existing service.

The travel demand forecasting approach utilizes a two-stage model system. The first stage forecasts the growth in the total number of person trips in each market, and the second stage predicts the market share of each available mode in each market. Both stages are dependent on the service characteristics of each mode and the socio-economic characteristics of the corridor. The key markets addressed in the forecasting model system are defined by geographical location (i.e., origin-destination zone pair).

The study area is focused on the existing Washington-Lynchburg-Roanoke corridor, but also includes connecting service up the Northeast Corridor to Boston. The zonal system was developed for the study area, and defines the geographic level of detail at which the intercity travel demand forecasting process is applied.

Forecast Results

The ridership forecast was prepared based on 2013 demographics and FY2013 Amtrak base ridership. Table 3 provides the annual boardings and alightings for the Roanoke extension for the proposed Roanoke station and the connecting Blacksburg bus service for trips entirely south of Washington and trips which travel through Washington and connect to the Northeast Corridor.

Annual Rail Boardings/Alightings for Roanoke Extension

	South of Washington	Through Washington	Total
Roanoke	20,076	28,209	48,246
Blacksburg (connecting bus service)	6,134	11,114	17,248
Total Boardings/Alightings	26,210	39,323	65,534

Task 2 - Facility Needs Assessment

An initial step in the planning and design of the intermodal transportation facility for the City of Roanoke was the development of the program for the facility. The central purpose of this process is to identify and understand the nature of the challenges and needs associated with the facility. The program is a detailed list of the activities that will take place at the intermodal facility and a determination of the level at which the activities will occur. The program identifies the different modes of transportation and forms of vehicle, pedestrian and bicycle access that will serve the facility, as well as appropriate passenger amenities. It also identifies the number and types of vehicles that will operate in and out of the intermodal facility, including peak period demands and the number of passengers that will use the facility.

Because the transit center would serve both Valley Metro and Amtrak riders and employees, planning for shared functional spaces is essential in the design of an efficient intermodal facility.

Information to develop the facility program was collected by the design team through interviews with City administration and planning individuals and Valley Metro staff. In individual discussions and joint meetings, the current and future needs for the facility were established and a list of activities was developed for the facility program. Both current and future needs were discussed since the intermodal facility must be designed to accommodate any future expansion of transit services that is likely to take place during the forty year useful life of the facility. From these discussions, the program information was developed for vehicle operations, slip alignment and juxtaposition, building envelope and passenger amenities. In addition, a public information meeting was held to solicit ideas, suggestions and recommendations from system users and the general public for the proposed facility. Attendants were able to give verbal and written comments for the City and designers to consider while developing the program and designing the new intermodal facility.

The total recommended program for the proposed intermodal transportation project is a facility component of approximately 10,102 square feet, an approximate total site program of 114,306 square feet, and an Amtrak platform of 11,900 square feet.

Task 3 - Site Evaluation

Overview of Selection process

The Site Selection process for this study involved several related tasks in addition to examining potential locations to build an intermodal facility. As part of the site selection process, an environmental study was conducted to determine if any adverse environmental impacts would result from the construction of an intermodal transportation facility. Also conducted at the time of site selection was an examination of the rail patronage that can be expected at the Roanoke Amtrak station. Rail patronage is directly related to the size of the passenger waiting area, amenities, and the need for parking. A review of the economic impacts or benefits was conducted as well as reviews of impacts on traffic and parking availability that might result from the construction of an intermodal facility in Roanoke. The findings of all of these studies are presented in this report.

Initial Sites and Concepts

In order to locate the site that best would accommodate all functions of the intermodal facility, Wendel began by working with City and GRTC staff to identify the boundaries of an appropriate study area and property parcels within the study area that potentially could accommodate the facility. The key factor that drove the definition of the study area for the multimodal facility was the location of the future Amtrak platform. The location of the rail platform had previously been determined by the Virginia Department of Rail and Public Transportation, the City of Roanoke, Amtrak, and Norfolk Southern.

The rail platform is located adjacent to Norfolk Avenue near the intersection with Jefferson Street and on the southern side of the Norfolk Southern tracks which served as the northern boundary of the study area. Potential properties within a quarter-mile of the platform were identified, and these were then developed into five distinct areas that were considered large enough to accommodate the total program. Based on the walking distances to the platform, it was agreed two of these areas were too distant to be considered as further viable sites. The three remaining areas were considered to be within an acceptable walking distance to the platform and also located near the existing bus transfer area at Campbell Court.

Preferred Site Concepts

After defining this more compact focus area, several conceptual layouts for an intermodal facility were developed. Design concepts for the sites are reviewed in the following section of this report. The conceptual layouts included the train platform, intermodal center, GRTC bus and Greyhound bus access, pedestrian movements, kiss-n-ride drop offs, and future development. The study area also was adopted to define the boundaries for the NEPA investigations and study.

Civil

Standards and codes which govern site development for this project include the City of Roanoke Erosion and Sediment Control, Stormwater Management, and Zoning Ordinances, and other commonwealth and federal regulations.

Existing Site Conditions

The subject properties are located within downtown Roanoke south of the Norfolk Southern Railroad and Norfolk Avenue, west of Jefferson Street and other private properties fronting Jefferson Street, north of Campbell Avenue and east of 1st Street SW and the Martin Luther King pedestrian bridge. Current land uses within the project areas include the following:

1. A surface parking lot consisting of three (3) parcels owned by John N. Lampros;
2. A parking garage owned by Merchant's Parking Company, Inc.; and
3. A bus station and parking garage owned by Greater Roanoke Transit Company (GRTC).

The existing topography is relatively flat within the project area with elevations ranging from approximately 918 to 920 (southeast to northwest) within the Lampros parking lot.

Floodplain Considerations

The majority of the proposed project lies within the one (1) percent annual chance (100-year) Zone A floodplain of Trout Run / Lick Run. A Zone A floodplain does not have an established base flood elevations (the water surface elevation of the one (1) percent annual chance flood).

If the project proceeds to subsequent design phase, existing hydraulic (floodplain) models should be acquired from FEMA (Federal Emergency Management Agency) to determine the base flood elevation and floodway limits, if any, within the project area. The proposed project would be analyzed and designed, as required, to result in no change from the existing base flood elevation upstream or downstream of the proposed project or encroach on the newly defined floodway limits. Proposed buildings will be designed in accordance with FEMA regulations and the City of Roanoke ordinances.

Zoning

The subject properties are zoned Downtown District. The purpose of this district is to "protect and enhance the public interest in downtown as a source of economic vitality." As per Section 36.2-315 of the City of Roanoke Code, bus passenger terminal or station and parking lot facilities are uses permitted only by special exception; parking structure facility and railroad passenger terminal or station are permitted uses. The Downtown District does not require building setbacks from lot lines.

Demolition

During Phase 1, the Lampros parking lot would be modified to accommodate the construction of a train station along Norfolk Avenue, new pedestrian walkways and a new parking configuration. Existing sidewalks within the adjacent rights-of-way of the subject properties along Norfolk Avenue and Salem Avenue would also be demolished and replaced, which may also require relocation of existing fire hydrants, street lights, and/or stormwater structures.

Phase 2 includes the demolition of the existing Merchants parking garage adjacent the Lampros parking lot to allow for the construction of the proposed Transit Station. Additionally the GRTC building will be demolished to allow for the construction of a proposed parking garage with retail space on the ground floor. Existing sidewalks within City rights-of-way adjacent to these demolition activities will be removed and replaced to provide an improved pedestrian experience and access among the proposed Transit Station, parking garage, and retail spaces.

Other Planned Improvements

The City of Roanoke is currently planning to reconstruct Norfolk Avenue to facilitate construction of the Amtrak platform north of Norfolk Avenue. As part of this project, Norfolk Avenue will be reconfigured and the existing Roanoke Rail Walk preserved and/or relocated as needed.

Utility Systems

The existing utility infrastructure in the project study area has sufficient capacity to accommodate the potential new intermodal transportation center. These utilities include gas, electric, communications,

fire protection, water, sanitary sewer, and storm sewer. Additional utility detail is contained in section three of this report.

Stormwater Management

Water quantity and quality control will be designed in accordance with the Part IIB criteria of the Virginia Stormwater Management Program (VSMP) Regulations (9VAC25-870), and Roanoke City Stormwater Management Ordinance. This project will be considered to be a redevelopment scenario.

Based on the Phase 1 and 2 concept plans, the following is a summary of approximate land cover per phase.

Phase 1:	Existing Impervious Area	=	106,890	square feet
	Proposed Impervious Area	=	99,270	square feet
	Proposed Managed Turf Area	=	7,630	square feet
Phase 1 and 2:	Existing Impervious Area	=	99,270	square feet
	Proposed Impervious Area	=	94,640	square feet
	Proposed Managed Turf Area	=	12,250	square feet

Quantity Control – Preliminary Analysis

Because the proposed project does not increase impervious surface area, stormwater quantity control facilities will not be required per 9VAC25-870-66[B,1,a]. The existing stormwater system may require additional research to determine whether or not the area currently experiences localized flooding during the 10-year 24-hour storm event in which case additional stormwater quantity controls would be required. If the area currently experiences localized flooding, post-development peak flow rates for the 10-year 24-hour storm event must be (a) confined within the stormwater conveyance system to avoid localized flooding, or, (b) the post-development peak flow rate for the 10-year 24-hour storm event must be less than the predevelopment peak flow rate. If option b is utilized no further downstream analysis is required to show compliance with flood protection criteria.

Quality Control – Preliminary Analysis

Although the proposed project does not result in an increase of impervious area, the total phosphorus load must be reduced by at least 20% per 9VAC25-870-63[2.a.] for both Phases independently. Compliance may be achieved with a combination of increasing greenspace areas and Best Management Practices (BMP) such as permeable pavement, rainwater harvesting, urban bio-retention, or manufactured BMPs (e.g. Filterra). Any BMP's selected shall meet the Standards and Specifications of the Virginia Stormwater BMP Clearinghouse. For example, approximately two (2) to three (3) Filterras treating 1.2 acres of impervious area will meet the required pollutant removal. The tables below provide an estimate of required total phosphorous load reduction.

Traffic Analysis

The purpose of the traffic analysis was to assess potential impacts to traffic conditions adjacent to the potential site of the intermodal transportation facility in downtown Roanoke. In particular, the study considered the impact of changes in both vehicular and pedestrian traffic related to the relocation of

the city's bus terminal, the relocation of a major downtown parking venue, and the addition of a new Amtrak passenger rail service.

An analysis of existing traffic conditions was performed on the four intersections that are will be most directly affected by the new development: 1st St SW at Salem Ave SW; 1st St SW at Campbell Ave SW; Jefferson Ave SW at Salem Ave SW; and Jefferson Ave SW at Campbell Ave SW.

When assessing the traffic impact of the new development, three primary changes were considered:

- Relocation of the Bus Terminal
- Relocation of the Parking Garage
- Addition of the Amtrak Station

Results of the Study:

Peak Hour Traffic Impact

This project is not expected to result in significant changes to future peak hour traffic volumes. The bus station will not generate new vehicular traffic. New trips generated by the train station will occur well outside of peak traffic hours—6 a.m. and 10 p.m. on weekdays.

The parking garage is not expected to generate any more trips than the existing parking facilities, but does have the potential to change the routes that users utilize to access the facilities. While all entrance and exit points for the parking facilities are currently located on Salem Ave SW, the new parking garage will provide entrance and exit points on both Salem Ave SW and Campbell Ave SW.

Pedestrian Infrastructure Improvements

While the new Intermodal Transit Center is not expected to have a major effect on vehicular traffic patterns during peak travel hours of the day, it can be expected to change pedestrian traffic patterns at these intersections. In order to anticipate and accommodate these pedestrians, the city may be interested in pursuing some basic infrastructure improvements. Recommendations for improvements at three intersections are provided in the Traffic Analysis portion of section three of this report.

Parking Analysis

A parking study was conducted to determine an appropriate approach to providing parking to support the future intermodal facility. This analysis included capturing the parking inventory and occupancy during a typical weekday to understand the amount of public parking available to support the displacement of existing parking and the additional parking demand generated by the proposed Roanoke Amtrak station. The proposed Amtrak station will not only generate parking demand, but potentially could involve displacing one or two existing public parking facilities.

A parking inventory of the study area was compiled, along with occupancy counts. Based on the parking surplus/deficit analysis there are approximately 155 spaces available to support the Amtrak parking demand within one block of the proposed station.

The parking projection analysis for the Roanoke Intermodal facility based on both parking supply and demand shows a range between 20 and 113 vehicles. Since there is a parking surplus of 155 spaces projected within a block of the proposed Roanoke Intermodal facility, there is adequate supply

available in the area to support the station without constructing additional parking. However, adequate ADA parking should be provided at a convenient location to the station.

Additional detail is contained in the complete parking study which is contained in Appendix B of this report.

Task 4 - Conceptual Design

The conceptual design of the station began with the space program and general layouts for a combined train and transit station, including bus slips, parking and other amenities. The design team considered the general area of the preferred sites as identified, and used single designated sites or parcels as well as combinations of sites and parcels to offer various concept designs. The designs varied from how buses enter and exit the site, plus the different juxtapositions they have with boarding and alighting passengers.

GRTC prefers a sawtooth configuration for their bus slips. This design requires more area to function for buses circulation and passenger boarding and alighting; however it gives the transit operator much more operational flexibility in providing their core service. In developing the initial concepts, the sawtooth configuration was used as the preferred layout.

Using the space program, the preferred bus configuration and circulation and the designated sites, the design team prepared several designs for review and feedback from the steering committee. Most team members appreciated the amount of area required for the bus circulation and parking requirements. However, during the course of presenting the various options, the design team was made aware of physical constraints to which the site must conform. First, the MLK, Jr. Pedestrian bridge should be considered historic and off limits for any alterations. Secondly, it is desirable to have at least one lane of Norfolk Avenue remain open once the passenger platform is completed. Lastly, Salem Avenue should remain a two way street. Salem Avenue may be altered to constrain vehicular traffic flow (traffic calming) and/or add additional parking, but the street must remain two way.

With this new information in hand, the design team prepared new concepts that took into account these three requirements. The new concepts included sawtooth bus slips, as well as modified herringbone bus slips. The concepts were prepared on sites 1 and 1A which uses the entire Lampros property and the adjacent Merchants Parking Deck.

Following review of these concepts, the steering committee preferred the sawtooth layout for the GRTC bus operations, and those concepts were further developed, including three dimensional (3D) modeling. Once the models were ready, the design team presented to the steering committee for comment and feedback. The primary comment received was the design should support a phased plan whereby the train component could be developed while funding and right of way acquisition progress toward implementing the ultimate plan.

The design team has prepared a phasing plan for several of the options. One includes utilizing both the Lampros Property and the Merchants Parking Deck, and a second option that utilizes the Lampros Property only. The latter option does not use a sawtooth configuration for bus slips, but rather the modified herringbone slip configuration. This option reduces the overall right of way required and subsequent costs for the project.

Task 5 - NEPA Analysis and Documentation

A National Environmental Policy Act (NEPA) study was undertaken as required by federal agencies for receipt and use of federal funds. There are three (3) levels of study that NEPA reviews may fall under. For this project, a Categorical Exclusion (CATEX), the minimal of all studies was required to document any environmental effects and potential mitigation measures to address those.

On behalf of the City of Roanoke, and as part of the Wendel project team, Draper Aden Associates completed a Categorical Exclusion and Documented Categorical Exclusion Worksheet (CATEX) for a proposed project in downtown Roanoke (Proposed Action). The Proposed Action for the Categorical exclusion was defined as the development of a Passenger Rail and Transit Intermodal facility in Downtown Roanoke.

Federal funding likely will be sought for these transportation-related project elements; therefore, the Proposed Action is subject to the regulations and guidance established by National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 et seq.). Projects or actions which do not have significant effects on the human and natural environment may be categorically excluded from certain documentation requirements of NEPA. Categorical Exclusions as defined in 23 CFR 771.118 include actions which do not induce significant impacts to planned growth or land use for an area, do not require the relocation of significant numbers of people, and do not involve significant impacts to any natural, cultural, recreational, historic, community or other resource. Furthermore, the action must not have significant impacts to air, noise, or water quality or have a significant impact on existing travel patterns. An action that qualifies as a Categorical Exclusion does not require the preparation of an environmental assessment (EA) or environmental impact statement (EIS) (i.e., it is categorically excluded from the need for such documentation).

The Proposed Action does not qualify as an Automatic CE or a PCE. Results of technical studies and resource analyses that were prepared clearly demonstrate the Proposed Action will not have significant environmental impacts.

Criteria Required for Documented Categorical Exclusion

The CATEX documents the following natural, cultural, and community resources and issue areas required by NEPA for the Proposed Action:

- Traffic, Transportation and Parking;
- Land Acquisition and Displacements;
- Land Use and Zoning;
- Air Quality;
- Noise;
- Cultural and Natural Resources;
- Visual/Aesthetics;
- Public Safety and Security;
- Ecologically Sensitive Areas and Endangered Species;
- Wetlands;
- Water Resources/Water Quality;
- Floodplains;
- Wild and Scenic Rivers, Navigable Waterways, and Coastal Resources;
- Farmlands;

- Socioeconomics;
- Environmental Justice (EJ);
- Environmental Risk Sites and Hazardous Materials;
- Seismic;
- Property Acquisition;
- Construction Impacts; and
- Indirect and Cumulative Impacts.

Conclusion of NEPA

Based on a review of environmental components and evaluation of impacts associated with the City of Roanoke's implementation of the proposed action, no significant direct, indirect, or cumulative impact on the human or natural environment is anticipated. The existing management and control systems combined with implementation in compliance with existing environmental regulations and best management practices (BMPs) would mitigate potential impacts associated with the new passenger rail and transit intermodal facility. It should be noted that Draper Aden Associates was unable to determine the potential for negative impacts to historical resources at this time given the preliminary nature of this project. This information will need to be further evaluated as additional details are available via official consultation with Virginia Department of Historic Resources (VDHR) to be initiated by FTA.

The full Categorical Exclusion and Documented Categorical Exclusion Worksheet are located in Appendix B of this report.

Task 6 - Economic Analysis

The economic impact of the intermodal facility project will be realized in two phases: (1) initial capital investment, which provides a one-time impact during the construction period, and (2) intermodal facility operations, which include the operations of Amtrak and bus services after the project is completed as well as commercial developments at the station. For both phases, the direct, indirect, and induced impacts in spending and job creation were estimated.

The initial investment would generate a sizable economic impact in the City of Roanoke. From 2016 to 2017, initial investment activities would generate a total economic impact (including direct, indirect, and induced impacts) of $17.2 million that can support 114 cumulative jobs in the City of Roanoke. Among the total economic impact, $10.9 million is derived from direct spending during the project development phase of intermodal facility. This spending can directly support 59 cumulative jobs in the region from 2016 to 2017. The indirect impact in the region during the development phase is $4.1 million and 37 cumulative jobs from other industry support of the initial investment, such as equipment rental or truck transportation. The induced impact during the development phase is expected to be $2.2 million, which can support 17 cumulative jobs—these jobs are expected to be concentrated in consumer service-related industries such as restaurants, hospitals, and retail stores. The annual average economic impact (including direct, indirect, and induced impacts) of project development activities is estimated to be $8.6 million, which can support 57 jobs per year in the city from 2016 to 2017.

The total annual operational impact (direct, indirect, and induced) of the Roanoke intermodal facility is estimated to be $14.3 million in 2018, which can support 59 jobs in the city. Among those, direct revenues from the intermodal facility operation, Amtrak operation, bus service, taxi service, and other retail and food establishments are estimated to be $9.8 million, which can support 48 jobs. The

indirect impact is estimated to be $2.6 million and 6 jobs, benefiting other businesses within the city that support all businesses at intermodal facility. The induced impact is estimated to be $1.8 million and 5 jobs in the city, mostly benefiting consumer-related businesses such as retail shops, healthcare facilities, and restaurants.

Additionally, there are three broad user benefits estimated in this study. The first is travel time savings from congestion mitigation. The second benefit is motor vehicle-related cost savings. The third benefit is safety. The total user benefits are estimated to be $9.1 million per year if Amtrak services remain at the existing level in 2018.

In regard to the fiscal impact for State and City governments, the ongoing operation of the intermodal transportation facility can contribute $63,068 in various taxes leveraged on meals, lodging and other goods per year to the City of Roanoke, and $177,377 in taxes to the state in 2018.

Recommended Next Steps

Following the City Council presentation on June 15, 2015, the feasibility report will be finalized. A subsequent public information meeting in early August will be held to present the findings of the study.

Following the public information meeting and comments received, the Wendel team will meet with City officials and prepare an action plan for moving forward. This plan will address the more immediate needs for providing accommodations in anticipation of the Amtrak services beginning in early 2017, while at the same time understanding the overall development master plan for the transportation needs of all modes of transportation. The recommendations outlined as well as the feasibility study and completed NEPA will serve the city well in seeking funds for implementation of the project plan.

Project Initiation and Rail Patronage Study

Study Goal

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Also discussed during the meeting were the multiple platform locations currently under consideration, the City's recent parking study, the need to quickly initiate the ridership forecast work, the potential framework for a Categorical Exclusion document, possible public input and informational meetings, and the next steps for developing the project space needs through site visits and stakeholder interviews.

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information needed in order to assess and analyze the project's projected economic benefit to the City and surrounding region.

The following is the full Rail Patronage Study that was performed for the project.

Rail Patronage Study

Introduction

The documentation in this section presents the methodology and results of the rail patronage study for the proposed Roanoke station. The study was conducted for the City of Roanoke with the participation of the Virginia Department of Rail and Public Transportation (DRPT). The proposed service would replace the existing Smart Way Connector Bus between Lynchburg and Roanoke, with the bus continuing service from Roanoke to the Blacksburg/Virginia Tech area.

Data collected for this effort included demographic data for the Roanoke Transportation Management Area, including population and employment for years 2010 and 2040, national demographic data including population, employment, and income at the Census Division level for the entire study area for years 2010 and 2013, total ridership for the Washington-Lynchburg Amtrak route for FY13 and FY14, and total ridership for the Smart Way Connector Bus for FY12, FY13, and FY14.

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The inputs required for this model analysis include:

- Geographic zonal system covering the study area
- Existing rail and bus ridership
- Socio-economic data for the zone system
- Highway network connecting all of the zones and rail stations in the study area
- Rail schedules for the existing and proposed service
- Travel characteristics for auto and rail

Model Structure

The travel demand modeling approach used in this project is based on a model system developed by AECOM and used in many previous applications to evaluate proposed intercity and high speed rail services for several states and Amtrak throughout the country. The travel demand model was originally developed from extensive market research and observed travel volumes and service characteristics by mode, conducted/assembled in the various study corridor markets including Northeast, Southeast, and other regions.

The travel demand forecasting approach utilizes a two-stage model system. The first stage forecasts the growth in the total number of person trips in each market, and the second stage predicts the market share of each available mode in each market. Both stages are dependent on the service characteristics of each mode and the socio-economic characteristics of the corridor. The key markets addressed in the forecasting model system are defined by geographical location (i.e., origin-destination zone pair).

The first stage addresses the growth in the total intercity person travel volumes. This includes "natural" growth and "induced" demand. The "natural" growth component is captured by the growth

in population and employment. The "induced" component is captured by including a measure of the composite level of modal service, expressed in the mode share model, within the total travel model. The second stage of the model is the mode share component, which estimates the share of total person travel by mode. This model considers both auto and rail. Key variables in the mode share model include:

- Line haul travel time
- Access/egress time
- Travel cost or fare
- Frequency of service

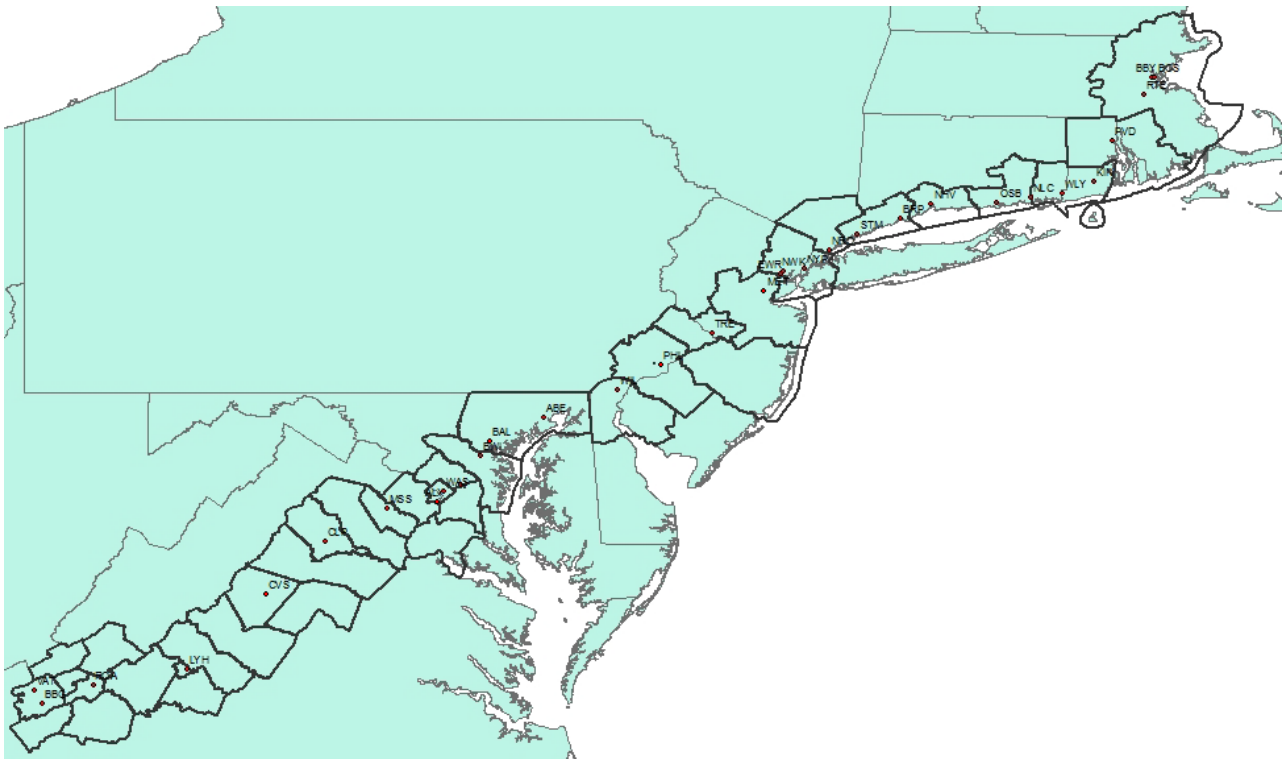
Total market-to-market frequencies were scaled based on arrival and departure times of each train serving the market. These scaling factors are based on the observed performance of trains in different departure/arrival time slots within rail corridors throughout the US. The rail utility and market share is determined by the combination of arrival and departure factors along with the time to the previous and subsequent trains, travel time, cost, access/egress times and on-time performance.

The mode choice model was calibrated to match the existing corridor by running the time, cost, and frequency characteristics of the existing Amtrak service, with current population, employment, and income data. The model parameters were then adjusted until the forecasted output corresponded with the actual ridership data.

Study Area Geography

The study area is focused on the existing Washington-Lynchburg-Roanoke corridor, but also includes connecting service up the Northeast Corridor to Boston. The zonal system was developed for the study area, and defines the geographic level of detail at which the intercity travel demand forecasting process is applied. The study area is found in Figure 1.

Figure 1. Roanoke Study Area



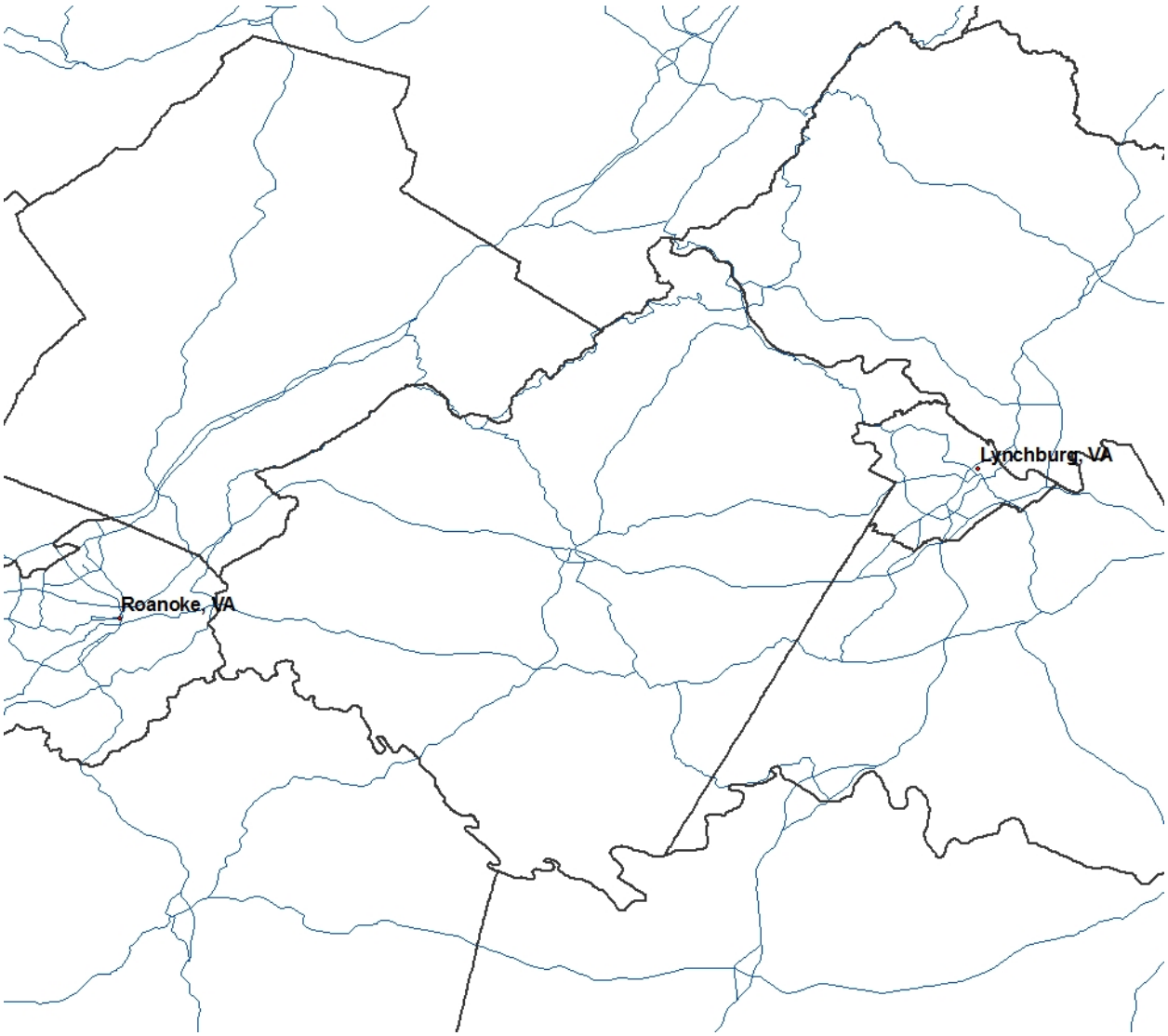
Network and Service Area Characteristics

Service characteristics are the key independent variables for the mode choice modeling process. The model in the project uses the following service characteristics:

- Travel time (minutes)
- Travel cost (dollars)
- Frequency (rail departures per day)

The auto service characteristics for each study area zone pair, including time, distance, and cost, were developed using a GIS-based intercity highway network. The network was derived from the Oak Ridge National Highway Network, of which an example is shown in Figure 2.

Figure 2. Highway Network



In order to create zone-to-zone travel times, a set of network skims were produced using ArcGIS by creating the minimum travel time path to/from each zone centroid in the study area based on congested travel time. Each minimum path calculation produces the time, distance and toll costs associated with the trip. In additional to tolls, auto cost is calculated at a per-mile basis of $0.54 per mile for business travel (full reimbursement cost), and $0.15 per mile for non-business travel (incremental cost of fuel).

Service characteristics for rail travel were also developed for each study area zone pair. These were based on published time tables for existing service and the highway network. The key characteristics include line haul time, frequency of service, fares, terminal times, access/egress times and costs, and rail on-time performance.

Published Amtrak timetables provided the basis for quantifying the line haul time and frequency of service. Average rail fares were obtained from previous rail studies in the corridor. The access/egress times and costs include the time/cost traveling from the origin zone to the boarding rail station, the time associated with the station, including waiting/boarding times, and the time/cost

traveling from the destination station to the final destination zone. Access/egress times and costs for travel between zones and stations were developed using the same network procedure and cost per mile rates described above and used for the auto zone-to-zone travel characteristics. The existing Washington to Lynchburg service has one round-trip per day, and the Roanoke analysis extended this service to the Roanoke station for the future analysis. Travel times and costs for the extended service were based on the speed and distance/cost relationships of the other station pairs in the corridor.

Demographic Data

Socio-economic data are used both to develop the base trip table as well as estimate market growth. The market growth in this case is a small portion, as it is only to factor the 2010 demographic data provided by the Roanoke Valley-Alleghany Regional Commission up to the base of 2013. The other major source of demographic data is Economy.com's national database at the county-level, which includes population, employment and per capital income for the years 2010 and 2013, which are based on Census numbers. Table 1 provides a summary of the 2010 and 2013 socio-economic data for selected major markets in the study area. These markets include the metropolitan areas surrounding the cities.

Figure 3: Summary of Socio-Economic Data

	2010			2013		
	Population	Employment	Per Capita Income (2005$)	Population	Employment	Per Capita Income (2005$)
Blacksburg, VA	110,974	45,051	24,419	112,422	47,410	25,535
Roanoke, VA	194,682	121,710	34,779	196,906	124,884	34,930
Lynchburg, VA	75,709	40,634	27,781	77,440	41,245	27,944
Charlottesville, VA	142,753	87,482	40,490	148,364	89,404	39,853
Culpepper, VA	54,362	18,099	31,540	56,586	18,839	31,826
Manassas, VA	459,146	117,138	38,898	494,191	126,732	38,689
Washington, DC	3,746,666	2,284,090	90,719	3,912,659	2,348,886	91,305

Base Travel Market Data

The base trip table was developed for the three trip purposes: business, recreation, and other. The first step was to determine the total annual travel between all zonal pairs in the study area. This was done by applying standard market formulas from other nationwide studies using the socio-economic characteristics such including population, employment, and income, and travel related service characteristics including distance and travel time, and then calibrating it to match known data from various sources, including rail ridership from Amtrak (FY13 ridership for the Washington-Lynchburg train) and estimates of auto travel from the NEC Intercity Auto Origin-Destination study by the Northeast Corridor Commission. The total trips were then split by purpose for each zonal pair using the trip purpose split from the NEC Intercity Auto OD study. Table 2 provides a summary of base trips to and from selected major markets in the study area. These markets include the metropolitan areas surrounding the cities.

Figure 4: Summary of Estimated Annual Person Trips by Purpose for Major Markets

	Business	Recreation	Other	Total
Blacksburg, VA	577,805	622,896	1,994,527	3,195,228
Roanoke, VA	1,299,200	1,400,590	4,484,717	7,184,508
Lynchburg, VA	652,610	703,540	2,252,750	3,608,900
Charlottesville, VA	992,329	1,069,770	3,425,425	5,487,524
Culpepper, VA	1,200,406	1,294,086	4,143,688	6,638,180
Manassas, VA	1,408,815	1,518,759	4,863,098	7,790,672
Washington, DC	3,223,035	3,474,560	11,125,612	17,823,208

Forecast Results

The ridership forecast was prepared based on 2013 demographics and FY2013 Amtrak base ridership. Table 3 provides the annual boardings and alightings for the Roanoke extension for the proposed Roanoke station and the connecting Blacksburg bus service for trips entirely south of Washington and trips which travel through Washington and connect to the Northeast Corridor.

Figure 5: Annual Rail Boardings/Alightings for Roanoke Extension

	South of Washington	Through Washington	Total
Roanoke	20,076	28,209	48,246
Blacksburg (connecting bus service)	6,134	11,114	17,248
Total Boardings/Alightings	26,210	39,323	65,534

Facility Needs Assessment

Facility Programming

An initial step in the planning and design of an intermodal transit center for the City of Roanoke is the development of the program for the facility. The central purpose of this process is to identify and understand the nature of the challenges and needs associated with the facility. The program is a detailed list of the activities that will take place at the transit center and a determination of the level at which the activities will occur. The program identifies the different modes of transportation and forms of vehicle, pedestrian and bicycle access that will serve the facility. It also identifies the number and types of vehicles that will operate into and out of the intermodal facility including peak period demands and the number of passengers that will use the facility.

Intermodal transit centers may include administrative offices and operations functions for the employees such as break rooms, locker rooms and meeting rooms. The facility program also identifies the amenities that will be provided for the public at the intermodal center. These amenities can include climate controlled waiting areas, seating, bathrooms, information kiosks, vending or food service areas and other services inside the building and items such as bicycle racks or storage areas outside of the building. Because the transit center would serve both Valley Metro and Amtrak riders and employees, planning for shared functional spaces is essential in the design of an efficient intermodal facility.

All of this information is collected by the design team and then used to develop site, size and space planning estimates using industry standards for the activities. The acreage required for the site is determined by examining the access, movement and storage requirements for transit and service vehicles, the structure size for the facility and pedestrian, bicycle and automobile access and parking requirements for the facility. The approximate square footage required for the facility structure is determined by listing the activities that will take place at the facility and by using industry standards to calculate the amount of space that will be required to support those activities.

Information to develop the facility program was collected by the design team through interviews with City administration and planning individuals and Valley Metro staff. In individual discussions and joint meetings, the current and future needs for the facility were established and a list of activities was developed for the facility program. Both current and future needs were discussed since the intermodal transit center must be designed to accommodate any future expansion of transit services that is likely to take place during the forty year useful life of the facility. From these discussions, the program information was developed for vehicle operations, slip alignment and juxtaposition, building envelope and passenger amenities. In addition, a public information meeting was held to solicit ideas, suggestions and recommendations from system users and the general public for the proposed facility. Attendants were able to give verbal and written comments for the City and designers to consider while developing the program and designing the new intermodal facility.

The following section includes an overview of the facility uses, detailed program schedules for transit, rail, and site considerations. Programming questionnaires and public input forms and comments are located in Appendix A of this report.

On-Grade Bus Platform	
PLATFORMS, ON-GRADE	20 (16 MIN)
COACHES/REGIONAL BAYS	5
PARATRANSIT BAY	0

CONCEPT DESIGN
11/6/2014

BUS / REVENUE VEHICLES			OTHER PARKING				REMARKS
	Program			Program			
Bus Bays, standard; 36 - 42-ft	13		Taxi	5			Taxi Stand: 3-5 spots with train
BT Bus Bays, articulated; 60-ft	0		Supervisors	2			2 minimum
Bus/Coach Bays; 40 - 45-ft	3		Employees	3			2-3 custodial workers (1 inside, 1 outside)
Layover Bay	2		Drivers	16-20			
Total Bus Bays	**18**		Delivery	?			Vendors - Confirm with Greyhound/Amtrak
			K & R	6			Kiss and Ride - Confirm with Greyhound/Amtrak
Bike Share/Bike Storage	25-40		Car-share	?			Zip Car - Confirm with Greyhound/Amtrak
			Van/Carpool	?			Van Pools, Car Pools - Confirm with Greyhound/Amtrak
			Alt Vehicles	?			
			On-Site Total				

Key: OF = Office; WS = workstation/area; CL = Closed; OP = Open; SF = square feet; GRTC = Greater Roanoke Transit Company; GH = Greyhound; AM = Amtrak SH = Shared; F = Fenced

Note: Room areas on floor plans may vary from this schedule; program represents minimum or an estimate for individual rooms; rooms may vary due to configuration

ROOM #		DESCRIPTION	SPACE	SF EACH	QUANTITY	SF	GRTC/GH/AM/SH		REMARKS	FLOOR	CODE / REG / STANDARD
Transit Facility Building											
TF	1	Passenger Waiting	OP	15	40	600	SH		Access to amenities, wifi (train waiting space is combined)	1	
TF	2	Queuing for customer service	OP	15	2	30	SH		3' x 5' per person	1	
TF	3	Dispatch (supervisors)	OF	100	2	200	GRTC		Needs to have view to buses	1	
TF	4	Customer Service Office	WS	60	3	180	SH		ticket sales, photo area,	1	
TF	5	Cash Vault (fare storage)	OF	10	1	10	GRTC		in customer service area. Small vault under the desk.		
TF	6	Security Office	OF	200	1	200	SH			1	
TF	7	Copy/Work	OP	100	1	100	SH		Shared	1	
TF	8	Break Room	CL	300	1	300	SH	12	tables & chairs; pantry (counter, cabinet, sink, refrig)	1	
TF	9	Operators' Room	CL	300	1	300	GRTC	16	drivers	1	
TF	10	Lockers, half-height, stacked	CL	15	36	270	GRTC		Adjoining Drivers Room	1	
TF	11	Employee Toilet - Women	CL	200	1	200	SH		2 WC; 2 lav; 1 shower	1	
TF	12	Employee Toilet - Men	CL	200	1	200	SH		1 UR; 1 WC; 2 lav; 1 shower	1	
TF	13	File Room	CL	120	1	120	SH		Office supplies, brochures, schedules; 5-drawer lateral	1	
TF	14	Custodial	CL	60	2	120	SH		Housekeeping Closet	1	
TF	15	Drinking Fountain	OP	10	2	20	SH		electric water cooler	1	
TF	16	Public Restroom, Women	CL	240	2	480	SH		3 WC; 3 lavs; baby changing station, shower	1	
TF	17	Public Restroom, Men	CL	240	2	480	SH		2 UR; 1 WC; 3 lavs; baby changing station, shower	1	
TF	18	Lost & Found	CL	120	1	120	SH			1	
TF	19	GRTC IT	CL	150	1	150	GRTC		Incl NextBus	1	
TF	20	Kiosks	OP	20	4	80	SH		Incl queuing; ticketing kiosk, visitor information	1	
TF	21	Vending	OP	20	6	120	SH		Food/beverage (4); ATM (1); sundries (1)	1	
TF	22	Vending Storage	CL	10	6	60	SH			1	
TF	23	Elevator, 3500 lb; 1st floor	CL	100	1	100	SH		Cab clear inside (3500 lb) 80"x 65"	1	EMS stretcher 23"x 77"
TF	24	Elevator landing	OP	0	2	0	SH		Included in Circulation	1	
TF	25	Elevator Machine Room	CL	100	1	100	SH		Access from roof; adjacent Stair A	1	
TF	26	Stair A, 1st floor landing	CL	190	1	190	SH			1	
TF	27	Stair B, 1st floor landing	CL	190	1	190	SH			1	
		Subtotal				**4,920**					
		Circulation			**10%**	**492**					
		Mechanical/Electrical			**5%**	**271**			Incl sprinkler		
		Building Factor			**4%**	**227**					
		Total Transfer Center			**Total**	**5,910**			1st Floor Transfer Facility		
AMTRAK Train Station											
AM	28	ticket office		220	1	220			quik trak and ticket office most likely shared with GRTC customer service		
AM	29	ticket counter		8	2	16			2' Deep x 4' wide		
AM	30	T&E Office		250	1	250			To accommodate up to 5 people at a time, with computers, printers and a small conference table.		
AM	31	Mechanical Foreman Office		120	1	120			2' Deep x 4' wide		
AM	32	Guest Office		120	1	120			2' Deep x 4' wide		
AM	33	Baggage room		200	1	200			if required		
AM	34	baggage claim		200	1	200					
AM	35	Secure Storage		300	1	300					
AM	36	Lunch/Break Room		300	1	300			Break room with kitchenette		
AM	37	Communication/IT closet		120	1	120			revenue equipment, passenger display equipment, security server		

On-Grade Bus Platform	
PLATFORMS, ON-GRADE	20 (16 MIN)
COACHES/REGIONAL BAYS	5
PARATRANSIT BAY	0

CONCEPT DESIGN
11/6/2014

BUS / REVENUE VEHICLES			OTHER PARKING				REMARKS
	Program			Program			
Bus Bays, standard; 36 - 42-ft	13		Taxi	5			Taxi Stand: 3-5 spots with train
BT Bus Bays, articulated; 60-ft	0		Supervisors	2			2 minimum
Bus/Coach Bays; 40 - 45-ft	3		Employees	3			2-3 custodial workers (1 inside, 1 outside)
Layover Bay	2		Drivers	16-20			
Total Bus Bays	**18**		Delivery	?			Vendors - Confirm with Greyhound/Amtrak
			K & R	6			Kiss and Ride - Confirm with Greyhound/Amtrak
Bike Share/Bike Storage	25-40		Car-share	?			Zip Car - Confirm with Greyhound/Amtrak
			Van/Carpool	?			Van Pools, Car Pools - Confirm with Greyhound/Amtrak
			Alt Vehicles	?			
			On-Site Total				

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Note: Room areas on floor plans may vary from this schedule; program represents minimum or an estimate for individual rooms; rooms may vary due to configuration

ROOM #		DESCRIPTION	SPACE	SF EACH	QUANTITY	SF	GRTC/GH/AM/SH		REMARKS	FLOOR	CODE / REG / STANDARD
AM	38	Shed		100	1	100			Shed for air compressor and salt storage (with 480V, 3 Phase service)		
AM	39	Connex Storage Containers		160	5	800			20'x8'x8.5' (LxWxH)		
AM	40	Dumpster Pad		144	1	144			12'x12'x12"		
SH	41	Community Space		400	1	400			if required		
SH	42	Public restrooms				0			shared with GRTC		
SH	43	amenities				0			shared with GRTC		
SH	44	Waiting area				0			Shared with bus waiting		
AM	45	Rail Platform		14	850	11,900			850' x 14' - allow for rail walk integration/ security call box/ canopy		
AM	46	package handling		200	1	200					
SH	47	bike racks				0			included in site requirements		
SH	48	drinking fountain				0			Shared with GRTC		
SH	49	trash receptacles				0			Shared with GRTC		
		Subtotal				**15,390**					
		Circulation			**10%**	**1,539**					
		Mechanical/Electrical			**5%**	**846**					
		Building Factor			**4%**	**711**					
		Total AMTRAK			**Total**	**18,486**					
TOD											
TOD	50	Hospitatility				0					
TOD	51	Residential				0					
TOD	52	Office				0					

On-Grade Bus Platform	
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			K & R	6			Kiss and Ride - Confirm with Greyhound/Amtrak
Bike Share/Bike Storage	25-40		Car-share	?			Zip Car - Confirm with Greyhound/Amtrak
			Van/Carpool	?			Van Pools, Car Pools - Confirm with Greyhound/Amtrak
			Alt Vehicles	?			
			On-Site Total				

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ROOM #		DESCRIPTION	SPACE	SF EACH	QUANTITY	SF	GRTC/GH/AM/SH		REMARKS	FLOOR	CODE / REG / STANDARD
		Subtotal				**0**					
		Circulation			**10%**	**0**					
		Mechanical/Electrical			**5%**	**0**					
		Building Factor			**4%**	**0**					
		Total Building Above Transfer Center			**Total**	**0**					
Site Requirements											
S	52	Buses, standard		1,650	16	26,400		66	foot long sawtooth bay with 6' indent; incl bike rack	site	CNG potential
S	53	Buses, articulated		2,250	0	0		90	foot long sawtooth bay with 6' indent; incl bike rack	site	CNG potential
S	54	Platform, standard bus		1,193	16	19,082		18.07	foot wide; incl bench, ADA loading at bus door, detectable warning	site	
S	55	Platform, articulated bus		1,652	0	0		18.36	foot wide; incl bench, ADA loading at bus door, detectable warning	site	
S	56	Regional bus		1,650	5	8,250		66	foot long sawtooth bay with 6' indent; incl bike rack; Home Ride, Smart Way; also accommodate BT standard bus	site	
S	57	Regional bus Platform		1,193	5	5,965		18.07	foot wide; incl bench, ADA loading at bus door, detectable warning	site	
S	58	Layby/Layover Space		500	2	1,000			Allowance	site	
S	59	Bike Rack		96	4	384	SH		verify size/type	site	
S	60	Bike Lockers		12	4	48	SH		verify size/type	site	
S	61	Refuse Dumpster		60	1	60	SH				
S	62	Recycling Containers		20	2	40	SH				
S	63	Trash / Recycling Containers		3	14	incl	SH		on Bus Platforms		
S	64	Signage / Info Kiosk		3	14	incl	SH		on Bus Platforms		
S	65	Storage for exterior maintenance		300	1	300	SH		May be located inside building footprint		
S	66	Landscaped areas, walkways					SH		Strengthen pedestrian connection to the market area		
S	67	Bikeshare		360	1	360	SH				
		Subtotal				**61,889**					
		Circulation, bus vehicles			**75%**	**46,417**					
		Total Site Requirements			**Total**	**108,306**					
Parking											
PK	68	Taxi		350	5	1,750					
PK	69	Police/Security		350	2	700					
PK	70	Employee/Driver		350	6	2,100	SH		Supervisor, Maintenance, office staff		
PK	71	Delivery		500	1	500	SH		Loading dock/berth		
PK	72	Kiss & Ride		176	6	1,056	SH				
PK	73	Car-share/rental		350	8	2,800					
PK	74	Vanpool/Carpool		350	0	0			LEED		
PK	75	Alternate Fuel Vehicles		350	0	0			LEED		
		Subtotal			**28**	**8,906**					
		Circulation			**100%**	**8,906**					
		Total Parking			**Total**	**17,812**					
Summary/Totals											
TF		**Transit Facility Building**				**5,910**					
AM		**AMTRAK Train Station**				**18,486**					

On-Grade Bus Platform	
PLATFORMS, ON-GRADE	20 (16 MIN)
COACHES/REGIONAL BAYS	5
PARATRANSIT BAY	0

CONCEPT DESIGN
11/6/2014

BUS / REVENUE VEHICLES			OTHER PARKING				REMARKS
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			K & R	6			Kiss and Ride - Confirm with Greyhound/Amtrak
Bike Share/Bike Storage	25-40		Car-share	?			Zip Car - Confirm with Greyhound/Amtrak
			Van/Carpool	?			Van Pools, Car Pools - Confirm with Greyhound/Amtrak
			Alt Vehicles	?			
			On-Site Total				

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Note: Room areas on floor plans may vary from this schedule; program represents minimum or an estimate for individual rooms; rooms may vary due to configuration

ROOM #		DESCRIPTION	SPACE	SF EACH	QUANTITY	SF	GRTC/GH/AM/SH		REMARKS	FLOOR	CODE / REG / STANDARD
TOD		**TOD**				**0**					
S		**Site Requirements**				**108,306**					
PK		**Parking**				**17,812**			Excludes off-site parking, charging stations, other		
		Subtotal				**150,514**					
		Stormwater				**1,000**			Water quality only		
		Setbacks				**0**			not yet determined		
		Total, program area				**302,028**					

Notes:

1. **Circulation:** Corridors, passages, stairs, vehicle turning radius, or any other necessary space needed for a person or vehicle to move from one location to another
2. **Building Factor:** Allowance for all interior and exterior wall components

Site Evaluation

Overview of Selection process

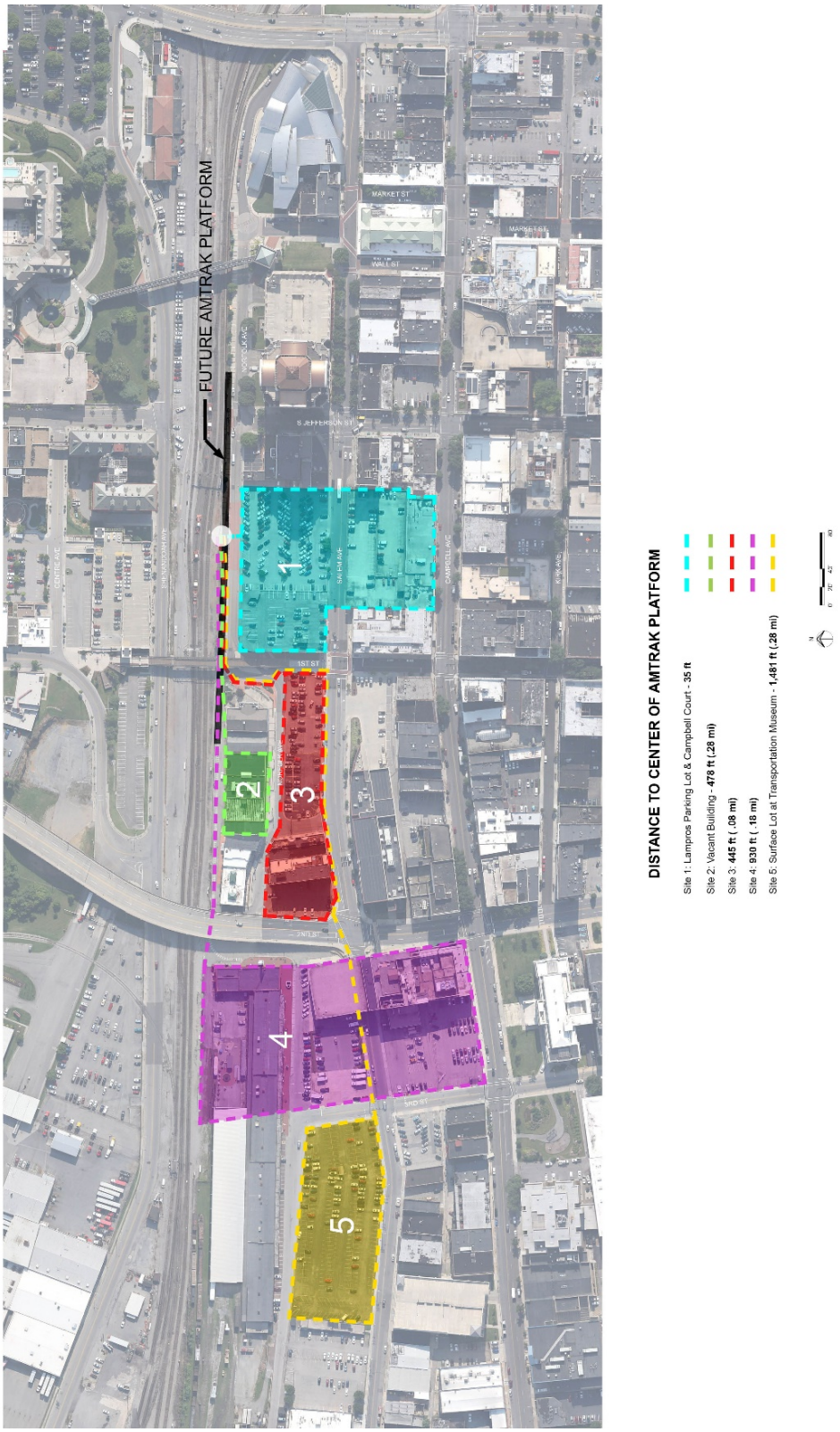
The Site Selection process for this study involved several related tasks in addition to examining potential locations to build an intermodal facility. As part of the site selection process, an environmental study was conducted to determine if any adverse environmental impacts would result from the construction of an intermodal transportation facility. Also conducted as an initial step of the site selection was an examination of the rail patronage that can be expected at the Roanoke Amtrak station. Rail patronage is directly related to the size of the passenger waiting area, amenities, and the need for parking. A review of the economic impacts or benefits was conducted as well as reviews of impacts on traffic and parking availability that might result from the construction of an intermodal facility in Roanoke. An overview of the findings of these studies are presented in this section. Full studies are available in Appendix B of the report.

Initial Sites and Concepts

In order to locate the site that best would accommodate all functions of the intermodal facility, Wendel began by working with City and GRTC staff to identify the boundaries of an appropriate study area and property parcels within the study area that potentially could accommodate the facility. The key factor that drove the definition of the study area for the multimodal facility was the location of the future Amtrak platform. The location of the rail platform had previously been determined by the Virginia Department of Rail and Public Transportation, the City of Roanoke, Amtrak, and Norfolk Southern.

The rail platform is located adjacent to Norfolk Avenue near the intersection with Jefferson Street and on the southern side of the Norfolk Southern tracks which served as the northern boundary of the study area. Potential properties within a quarter-mile of the platform were identified. The map indicates the five areas considered and the walking distance to the platform. Following discussion with city officials, it was agreed that areas 4 and 5 were too distant from the rail platform to be considered as further viable sites. Additionally, areas 1, 2, and 3 are located near the existing bus transfer area at Campbell Court.

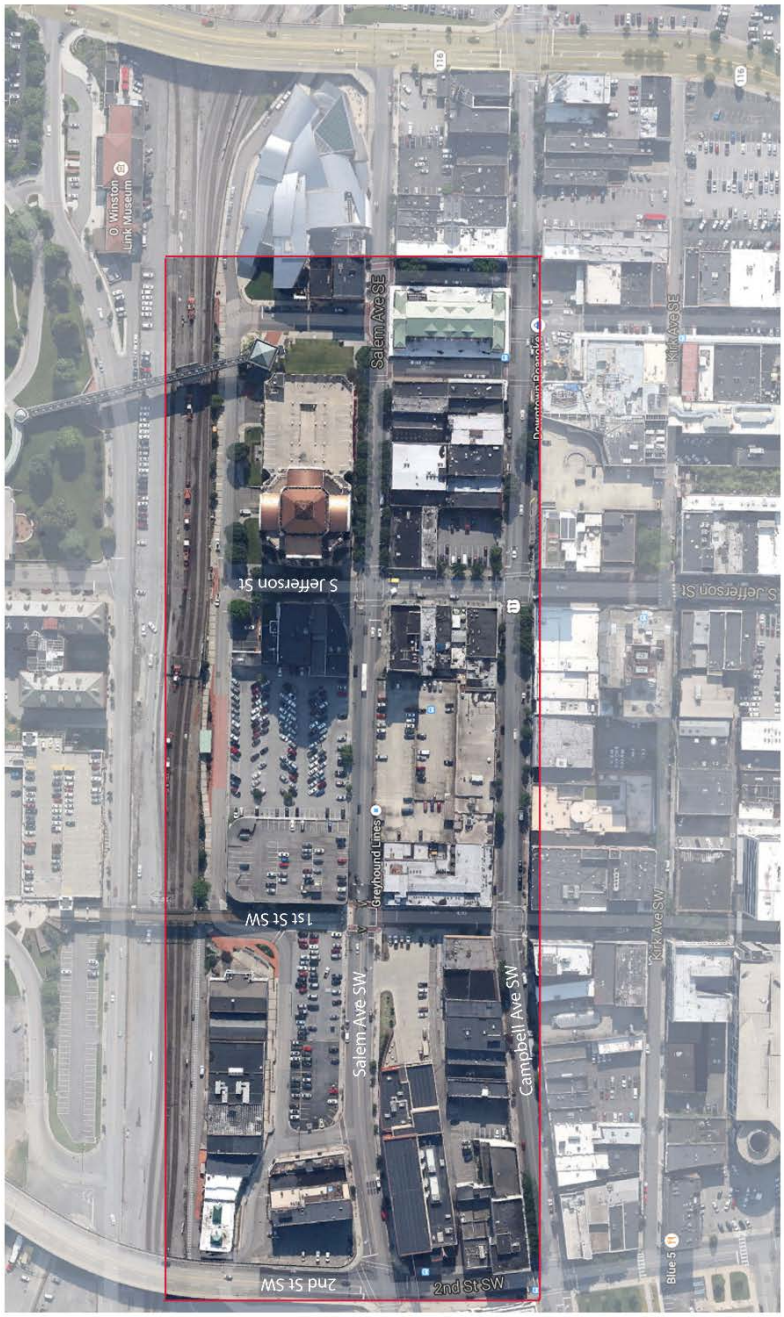
Figure 6: Study Area and Potential Parcels with Distance to Center of Amtrak Platform



Preferred Site Concepts

After defining a more compact focus area, several conceptual layouts for an intermodal facility were developed. Design Concepts for the sites will be reviewed in the following section of this report. The conceptual layouts included the train platform, intermodal center, GRTC bus and Greyhound bus access, pedestrian movements, kiss-n-ride drop offs, and future development. The study area also was adopted to define the boundaries for the NEPA investigations and study.

Figure 7: NEPA Boundary for Roanoke Feasibility Study



NEPA Boundary for Roanoke Feasibility Study

Civil Narrative

The civil narrative was prepared based on the known scope of the proposed project as shown on Figures C2 and C3, site reconnaissance, and readily available information, including aerial photography and topography, Federal Emergency management Agency (FEMA) Flood Insurance Rate Maps (FIRM) and Flood Insurance Study for Roanoke County dated 2007, and the City of Roanoke Real Estate GIS. A compiled sketch showing this information is provided on Figure C1.

Standards and codes which govern site development for this project include the City of Roanoke Erosion and Sediment Control, Stormwater Management, and Zoning Ordinances, and other commonwealth and federal regulations.

Existing Site Conditions

The subject properties are located within downtown Roanoke south of the Norfolk Southern Railroad and Norfolk Avenue, west of Jefferson Street and other private properties fronting Jefferson Street, north of Campbell Avenue and east of 1st Street SW and the Martin Luther King pedestrian bridge. Current land uses within the project areas include the following:

1. A surface parking lot consisting of three (3) parcels owned by John N. Lampros;
2. A parking garage owned by Merchant's Parking Company, Inc.; and
3. A bus station and parking garage owned by Greater Roanoke Transit Company (GRTC).

The existing topography is relatively flat within the project area with elevations ranging from approximately 918 to 920 (southeast to northwest) within the Lampros parking lot.

Floodplain Considerations

The majority of the proposed project lies within the one (1) percent annual chance (100-year) Zone A floodplain of Trout Run / Lick Run. A Zone A floodplain does not have an established base flood elevations (the water surface elevation of the one (1) percent annual chance flood). Trout Run flows southeast and is tributary to Lick Run and ultimately the Roanoke River via a network of large diameter storm sewers. Base flood elevations along Trout Run / Lick Run are defined approximately 900 feet east and 800 feet west of the project site as elevation 921 and 925, respectively. These base flood elevations suggest a potential inundation depth of approximately two (2) to four (4) feet on the project site. The existing and proposed floodplain limits are shown on Figures C4a and C4b.

In the next design phase of this project, existing hydraulic (floodplain) models should be acquired from FEMA (Federal Emergency Management Agency) to determine the base flood elevation and floodway limits, if any, within the project area. The proposed project will be analyzed and designed, as required, to result in no change from the existing base flood elevation upstream or downstream of the proposed project or encroach on the newly defined floodway limits. Proposed buildings will be designed in accordance with FEMA regulations and the City of Roanoke ordinances.

Zoning

The subject properties are zoned Downtown District. The purpose of this district is to "protect and enhance the public interest in downtown as a source of economic vitality." As per Section 36.2-315 of the City of Roanoke Code, bus passenger terminal or station and parking lot facilities are uses permitted only by special exception; parking structure facility and railroad passenger terminal or station are permitted uses. The Downtown District does not require building setbacks from lot lines.

Demolition

During Phase 1, the Lampros parking lot would be modified to accommodate the construction of a train station along Norfolk Avenue, new pedestrian walkways and a new parking configuration. Existing sidewalks within the adjacent rights-of-way of the subject properties along Norfolk Avenue and Salem Avenue would also be demolished and replaced, which may also require relocation of existing fire hydrants, street lights, and/or stormwater structures.

Phase 2 includes the demolition of the existing Merchants parking garage adjacent the Lampros parking lot to allow for the construction of the proposed Transit Station. Additionally the GRTC building will be demolished to allow for the construction of a proposed parking garage with retail space on the ground floor. Existing sidewalks within City rights-of-way adjacent to these demolition activities will be removed and replaced to provide an improved pedestrian experience and access among the proposed Transit Station, parking garage, and retail spaces.

Other Planned Improvements

The City of Roanoke is currently planning to reconstruct Norfolk Avenue to facilitate construction of the Amtrak platform north of Norfolk Avenue. As part of this project, Norfolk Avenue will be reconfigured and the existing Roanoke Rail Walk preserved and/or relocated as needed.

Utility Systems

Gas Service

Roanoke Gas Company provides natural gas service in the area. A site visit is required to determine how the gas line would be installed.

Electric Service

Appalachian Electric Power (AEP) lines are located within the vicinity of this project. All existing electrical lines in the project area are underground.

Communications Service

Cox Communications (Cable) and Verizon (DSL) both provide communications services in the area.

Water

Existing

Western Virginia Water Authority (WVWA) provides potable water to the site. In addition to treating potable water WVWA maintains existing and new lines. Existing 6-inch and 8-inch water mains perimeter the subject properties. Adequate capacity exists and additional demands resulting from the proposed construction of the Intermodal Transit Facility will have no appreciable effect on the quality of service provided WVWA to the surrounding community.

Existing fire hydrant spacing along the perimeter of the project area is approximately every 250 to 300 feet, which is sufficient for the proposed project. Additional fire hydrants are not anticipated for this project.

Proposed

For the train station (Phase 1) and the Transit Station (Phase 2), both domestic and fire protection services, as needed, are proposed via laterals from the existing 8-inch diameter main along Norfolk Avenue. Existing flow and pressure in the water lines surrounding the project will be verified by flow testing during the design process to determine the optimum connection point for service. All exterior fire protection services shall be in accordance with the International Plumbing Code and NFPA 24.

Sanitary Sewer

Existing
WVWA manages and maintains the City of Roanoke wastewater infrastructure.

A 30-inch sanitary main runs along Norfolk Avenue and is expected to have sufficient capacity to serve the train station for Phase 1, as well as the proposed transit station in Phase 2. The existing 8-inch sanitary sewer main along Salem Avenue is expected to have sufficient capacity to serve future retail development within the existing transit facility.

Proposed
A 35 foot 6-inch sanitary sewer lateral is proposed to connect to the 30-inch main to serve the train station during Phase 1. During Phase 2, additional laterals (approximately 35 feet each) connecting to existing mains on Salem and Campbell Avenues will be required to service the proposed Transit Station and Campbell Court developments.

Storm Sewer

Existing
Stormwater runoff from the project area flows into existing curb inlets along Norfolk and Salem Avenues (Phases 1 and 2) and 1st Street SW and Campbell Avenue (Phase 2). The inlets along Norfolk Avenue connect to an existing 60-inch storm sewer pipe located along the north right-of-way line of Norfolk Avenue. The curb inlets along Salem and Campbell Avenues and 1st Street SW connect to a 90-inch storm pipe located in the center of Campbell Avenue. The 60-inch and 90-inch storm pipes ultimately discharge into Lick Run immediately east of 581 and north of Campbell Avenue.

Proposed
Phase 1: Additional inlets and manholes are proposed to capture surface runoff from the reconfigured parking lot and train station and tie into the existing storm sewer on Norfolk and/or Salem Avenues. Connection to Salem Avenue will likely require replacement of approximately 40 feet of existing 8-inch storm sewer with a 15-inch storm sewer.

Phase 2: Additional inlets and manholes are proposed to capture surface runoff from the proposed transit station and bus hub and tie into the existing, upgraded storm sewer on Norfolk and/or Salem Avenues. No additional storm sewer infrastructure is anticipated for the redevelopment of the GRTC facility.

Stormwater Management

Water quantity and quality control will be designed in accordance with the Part IIB criteria of the Virginia Stormwater Management Program (VSMP) Regulations (9VAC25-870), and Roanoke City Stormwater Management Ordinance. This project will be considered to be a redevelopment scenario.

Based on the Phase 1 and 2 concept plans, the following is a summary of approximate land cover per phase.

Phase 1:	Existing Impervious Area	=	106,890	square feet
	Proposed Impervious Area	=	99,270	square feet
	Proposed Managed Turf Area	=	7,630	square feet
Phase 1 and 2:	Existing Impervious Area	=	99,270	square feet
	Proposed Impervious Area	=	94,640	square feet
	Proposed Managed Turf Area	=	12,250	square feet

Quantity Control – Preliminary Analysis

Because the proposed project does not increase impervious surface area, stormwater quantity control facilities will not be required per 9VAC25-870-66[B,1,a]. The existing stormwater system may require additional research to determine whether or not the area currently experiences localized flooding during the 10-year 24-hour storm event in which case additional stormwater quantity controls would be required. If the area currently experiences localized flooding, postdevelopment peak flow rates for the 10-year 24-hour storm event must be (a) confined within the stormwater conveyance system to avoid localized flooding, or, (b) the postdevelopment peak flow rate for the 10-year 24-hour storm event must be less than the predevelopment peak flow rate. If option b is utilized no further downstream analysis is required to show compliance with flood protection criteria.

Quality Control – Preliminary Analysis

Although the proposed project does not result in an increase of impervious area, the total phosphorus load must be reduced by at least 20% per 9VAC25-870-63[2.a.] for both Phases independently. Compliance may be achieved with a combination of increasing greenspace areas and Best Management Practices (BMP) such as permeable pavement, rainwater harvesting, urban bioretention, or manufactured BMPs (e.g. Filterra). Any BMP's selected shall meet the Standards and Specifications of the Virginia Stormwater BMP Clearinghouse. For example, approximately two (2) to three (3) Filterras treating 1.2 acres of impervious area will meet the required pollutant removal. The tables below provide an estimate of required total phosphorous load reduction.

Phase 1:

Pre-Development Load (TN) (lb/yr)	35.66
Maximum % Reduction Required Below Pre-ReDevelopment Load	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.80
Total Load Reduction Required (lb/yr)	**0.80**
Post-Development Load (TN) (lb/yr)	34.25

Phase 2:

Pre-Development Load (TN) (lb/yr)	34.25
Maximum % Reduction Required Below Pre-ReDevelopment Load	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.81
Total Load Reduction Required (lb/yr)	**0.81**
Post-Development Load (TN) (lb/yr)	33.16

Traffic Analysis

The purpose of traffic analysis was to assess potential impacts to traffic conditions adjacent to the potential site of multimodal transit facility in downtown Roanoke, Virginia. In particular, the study considered the impact of changes in both vehicular and pedestrian traffic related to the relocation of the city's bus terminal, the relocation of a major downtown parking venue, and the addition of a new Amtrak passenger rail service.

Study Intersections:

An analysis of existing traffic conditions was performed on the four intersections that are will be most directly affected by the new development: 1st St SW at Salem Ave SW, 1st St SW at Campbell Ave SW, Jefferson Ave SW at Salem Ave SW, and Jefferson Ave SW at Campbell Ave SW.

Figure 13: Traffic Analysis Intersections

When assessing the traffic impact of the new development, three primary changes were considered.

Relocation of the Bus Terminal

If it is decided to move the central bus station from the south side to the north side of Salem Ave SW, bus traffic that currently enters and exits the station from Campbell Ave SW will now enter it from Salem Ave SW. The bus station does not generate a significant amount of automobile traffic, meaning that auto traffic patterns are unlikely to change significantly because of this relocation.

Relocation of the Parking Garage

Parking spaces currently located on the north side of Salem Ave SW at location "B" could be impacted by the location of the intermodal facility. If so, one option to accommodate the loss of parking would be to provide additional parking on the south side of Salem Ave SW at location "A." A new or expanded garage at this location would provide a similar number of spaces as the existing parking facilities. Whereas the entrances and exits of the existing parking facilities are all currently located on Salem Ave SW, the new location will provide

entrances and exits on both Salem Ave SW and Campbell Ave SW. Some of the vehicles, therefore, that currently use Salem Ave SW may be expected to reroute to Campbell Ave SW.

Addition of the Amtrak Station

The addition of the Amtrak Station to the multimodal transfer facility will generate a significant amount of new pedestrian and automobile traffic. Based on 2013 demographics and FY2013 based Amtrak ridership, the service is expected to serve 65,534 total annual boardings and alightings in Roanoke.

If these trips were distributed evenly across every day of the year and every passenger traveled to or from the station separately, this would result in approximately 180 new trips per day. If it is assumed for the purposes of this analysis, however, that approximately 60% of ridership will occur on weekends (Friday-Sunday) and 40% of ridership will occur on weekdays (Monday-Thursday), then the number of trips generated on Monday-Thursday will be approximately 126 per day, while the number of trips generated Friday-Sunday will be approximately 252 per day.

Results of the Study:

Peak Hour Traffic Impact

This project is not expected to result in significant changes to future peak hour traffic volumes. The bus station will not generate new vehicular traffic. New trips generated by the train station will occur well outside of peak traffic hours—6 am and 10 pm on weekdays.

The parking garage is not expected to generate any more trips than the existing parking facilities, but does have the potential to change the routes that users utilize to access the facilities. While all entrance and exit points for the parking facilities are currently located on Salem Ave SW, the new parking garage will provide entrance and exit points on both Salem Ave SW and Campbell Ave SW.

In order to estimate the number of vehicles that currently arrive and depart from the parking facilities during peak hours, the total number of vehicles traveling on Salem Ave SW between 1st St SW and Jefferson Ave SW was compared.

Comparing the figures in this way, during the AM peak hour it is estimated that 160 vehicle enter the parking facilities—55 approaching from the west, and 105 approaching from the east. During the PM peak hour, it is estimated that 80 vehicles exit the parking facilities—50 departing to the west, and 30 departing to the east.

When the new parking garage is built at the location of the existing bus station, it was assumed that approximately half of these users would continue to enter and exit the parking garage on Salem Ave SW—either by habit or in order to avoid the heavier traffic volumes on Campbell Ave SW. The other half, however, would enter and exit from Campbell Ave SW. The changes in traffic volumes produced by this new pattern are shown in Figure 5 below.

Pedestrian Infrastructure Improvements

While the new Intermodal Transit Center is not expected to have a major effect on vehicular traffic patterns during peak travel hours of the day, it can be expected to change pedestrian traffic patterns at these intersections. In order to anticipate and accommodate these pedestrians, the city may be interested in pursuing some basic

infrastructure improvements. Recommendations for improvements at three intersections are provided below.

1) Jefferson Ave SW at Salem Ave SW

This intersection is located at the southeast corner of the block on which the new Transit Center will be located. Due to its location between the transit center and the Market St. area of downtown Roanoke, this intersection can expect to receive a large amount of pedestrian traffic coming and going from the transit center.

Currently, a channelized right turn lane is provided for southbound traffic on Jefferson Ave SW at this intersection. This area of pavement adds 20-30 feet to pedestrian crossing distance. Furthermore, this turning movement receives extremely low traffic volumes that do not appear to warrant the dedicated turning channel. The adjacent sidewalk could be expanded to include most or all of this right turn lane, thus creating a safe and more pleasant pedestrian crossing experience.

Pedestrian Bulbs at 2) Jefferson Ave SW at Campbell Ave SW and 3) 1st St SW at Campbell Ave SW

These two intersections are located on the southeast and southwest corners, respectively, of the block on which the new parking garage will be located. These intersections will facilitate pedestrian traffic between downtown Roanoke and both the parking garage and transit center.

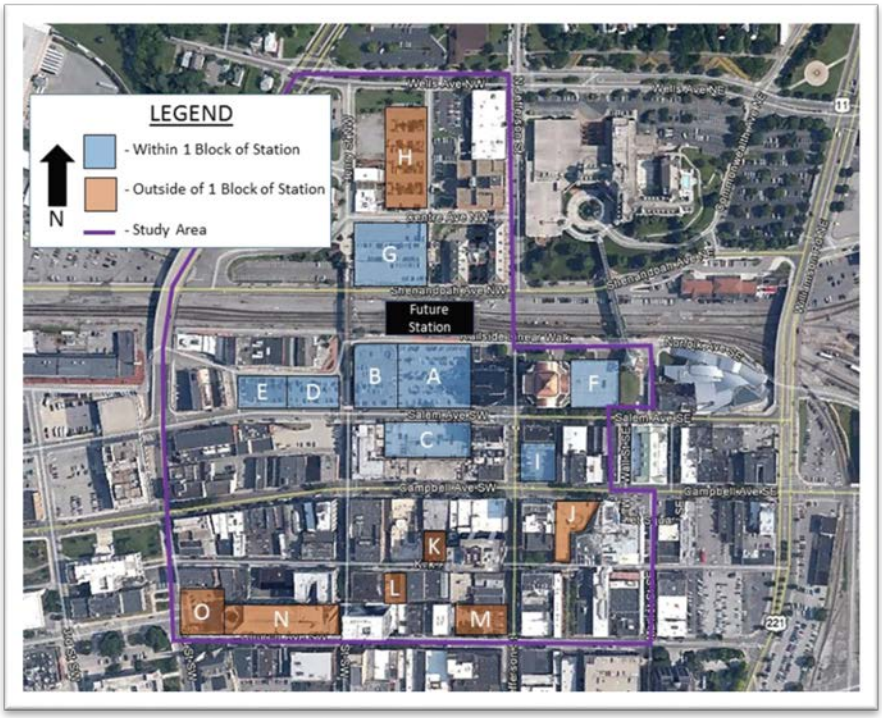
Opportunities may exist to provide pedestrian “bulbs” on the northwest and southeast corners of both intersections in order to reduce the pedestrian crossing distance across Campbell Ave.

Parking Study

A parking study was conducted to determine an appropriate approach to providing parking to support the future intermodal facility. This analysis included capturing the parking inventory and occupancy during a typical weekday to understand the amount of public parking available to support the displacement of existing parking and the additional parking demand generated by the proposed Roanoke Amtrak station. The proposed Amtrak station will not only generate parking demand, but potentially could involve displacing one or two existing public parking facilities. It is important to understand how these changes will impact the balance of parking.

The map below illustrates the study area and the public parking facilities that were analyzed. The parking facilities are color coded blue to show which facilities are within a block of the proposed station.

Figure 14: Public Parking Facilities



A parking inventory of the study area was compiled, along with occupancy counts taken on Wednesday, February 11, 2015. Further information can be found in the full parking study located in Appendix B of this report.

As discussed previously, the proposed Amtrak station could potentially displace the Knapsack Lot and/or the Salem Avenue Garage, which would combine for a loss of 465 spaces. There will also be additional parking demand generated by the station. In developing a future parking plan for the Amtrak station, it is essential to determine how much public parking will be available in the area. This analysis considers the existing peak parking demand, displacement of the Knapsack Lot and Salem Avenue Garage, and an 80% practical capacity factor. Based on the parking surplus/deficit analysis there are approximately 155 spaces available to support the Amtrak parking demand within one block of the proposed station.

A practical capacity factor has been applied to the analysis to account for seasonality factors, surges in demand, and the efficiency of the parking facilities. A parking facility and parking system become difficult to circulate and locate a space when it reaches its capacity. Providing additional parking capacity improves the level of customer service and makes it easier for a person to locate a parking space efficiently. Other parking management strategies can also be implemented to improve level of customer service and ease of finding a parking space, including: real-time parking availability signage, way-finding signage, online parking map, and online parking payment options.

The parking projection analysis for the Roanoke Intermodal facility based on both parking supply and demand shows a range between 20 and 113 vehicles. Since there is a parking surplus of 155 spaces projected within a block of the proposed Roanoke Intermodal facility, there is adequate supply available in the area to support the station without constructing additional parking. However, adequate ADA parking should be provided at a convenient location to the station.

Figure 15: Site Visit Photos

Photo 1: View from MLK Memorial Pedestrian Bridge

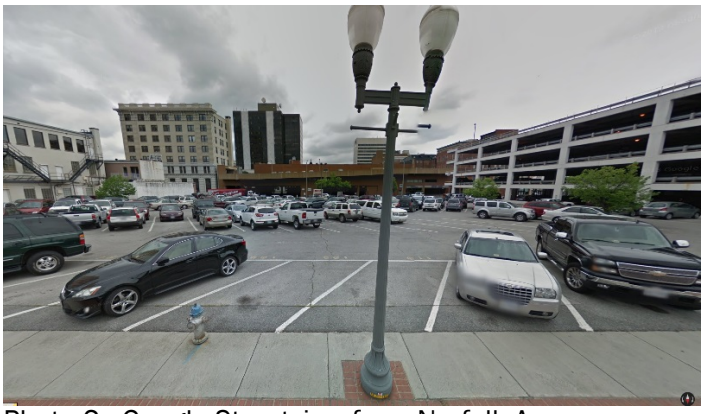


Photo 2: Google Streetview from Norfolk Ave

Photo 3: View of Norfolk Southern Platform

Photo 4: Google Streetview of Salem Ave SW

Photo 5: Lampros parking lot from Norfolk Ave

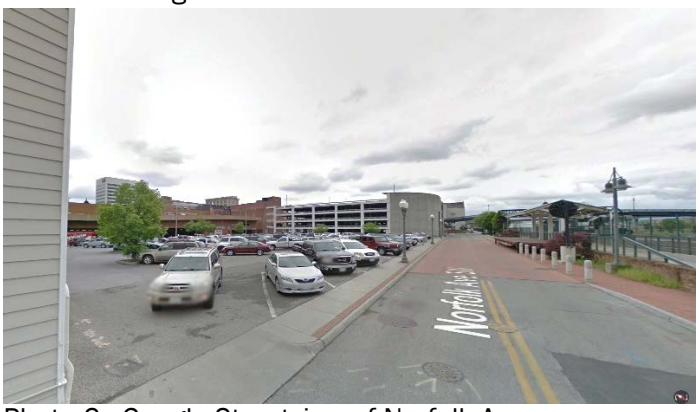


Photo 6: Google Streetview of Norfolk Ave

Photo 7: Merchants parking garage from Salem and Campbell intersection

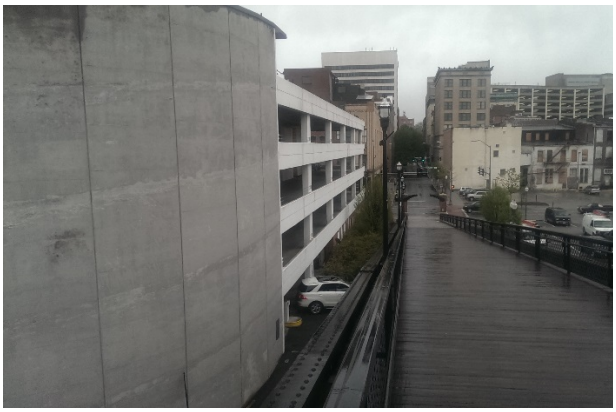


Photo 8: Merchants parking garage from MLK Memorial Pedestrian Bridge

Photo 9: Norfolk Ave from MLK Memorial Pedestrian Bridge

Photo 10: MLK Memorial Pedestrian Bridge from Norfolk Ave

Photos 11 & 12: MLK Memorial Pedestrian Bridge from Norfolk Ave

Photo 13: MLK Memorial Bridge from 1st St SW

Photo 14: Salem Ave SW from MLK Memorial Bridge

Photo 15: GRTC Transit Station from Merchants on Salem Ave

Photo 16: Norfolk Ave SW and S Jefferson St Intersection

Photo 17: GRTC Transit Station Campbell Ave Entrance

Photo 18: Campbell Ave SW looking East

ALL UTILITIES, BUILDINGS, AND TOPOGRAPHY SHOWN ARE PER ROANOKE CITY GIS AND FOR CONCEPTUAL USE ONLY.

GRAPHIC SCALE

100 0 50 100 200

(IN FEET)

1 inch = 100 ft.

LIMITS OF FLOOD INSURANCE STUDY

FLOODPLAIN ZONE A FIRM #51161C0164G

MERCHANTS PARKING GARAGE

LAMPROS PARKING LOT

EXISTING STORMWATER STRUCTURE (TYP.)

GRTC TRANSIT STATION CAMPBELL COURT

CAMPBELL AVENUE

Centre Ave NW

Shenandoah Ave NW

Norfolk Ave SE

Salem Ave SE

2nd St SW

Jefferson St

Appalachian Mountains

Blue Ridge

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Charlottesville, VA
Hampton Roads, VA
Coats, NC

DESIGNED: CEP
DRAWN: CEP
CHECKED: CAH
DATE: 04/17/2015

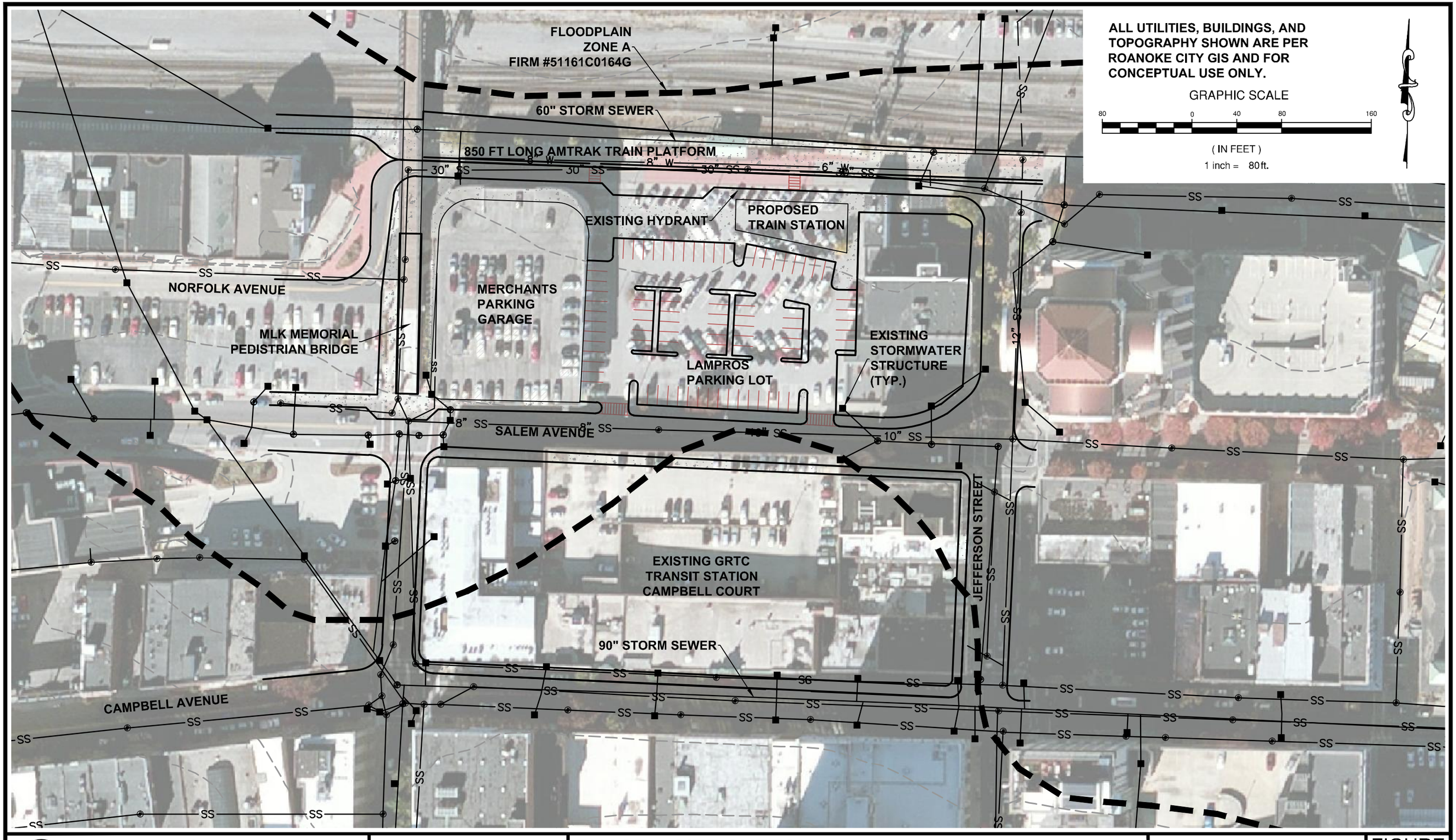
EXISTING CONDITIONS (GIS)
ROANOKE INTERMODAL TRANSIT FACILITIES

ROANOKE CITY, VIRGINIA

SCALE: 1" = 100'

PROJECT: B14134-01

FIGURE C-1



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GRAPHIC SCALE

80 0 40 80 160

(IN FEET)

1 inch = 80 ft.

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Coats, NC

DESIGNED: A/E
DRAWN: CEP
CHECKED: CAH
DATE: 04/17/2015

PHASE 1 SITE SKETCH
ROANOKE INTERMODAL TRANSIT FACILITIES

ROANOKE CITY, VIRGINIA

SCALE: 1" = 80'

PROJECT: B14134B-01

FIGURE
C-2

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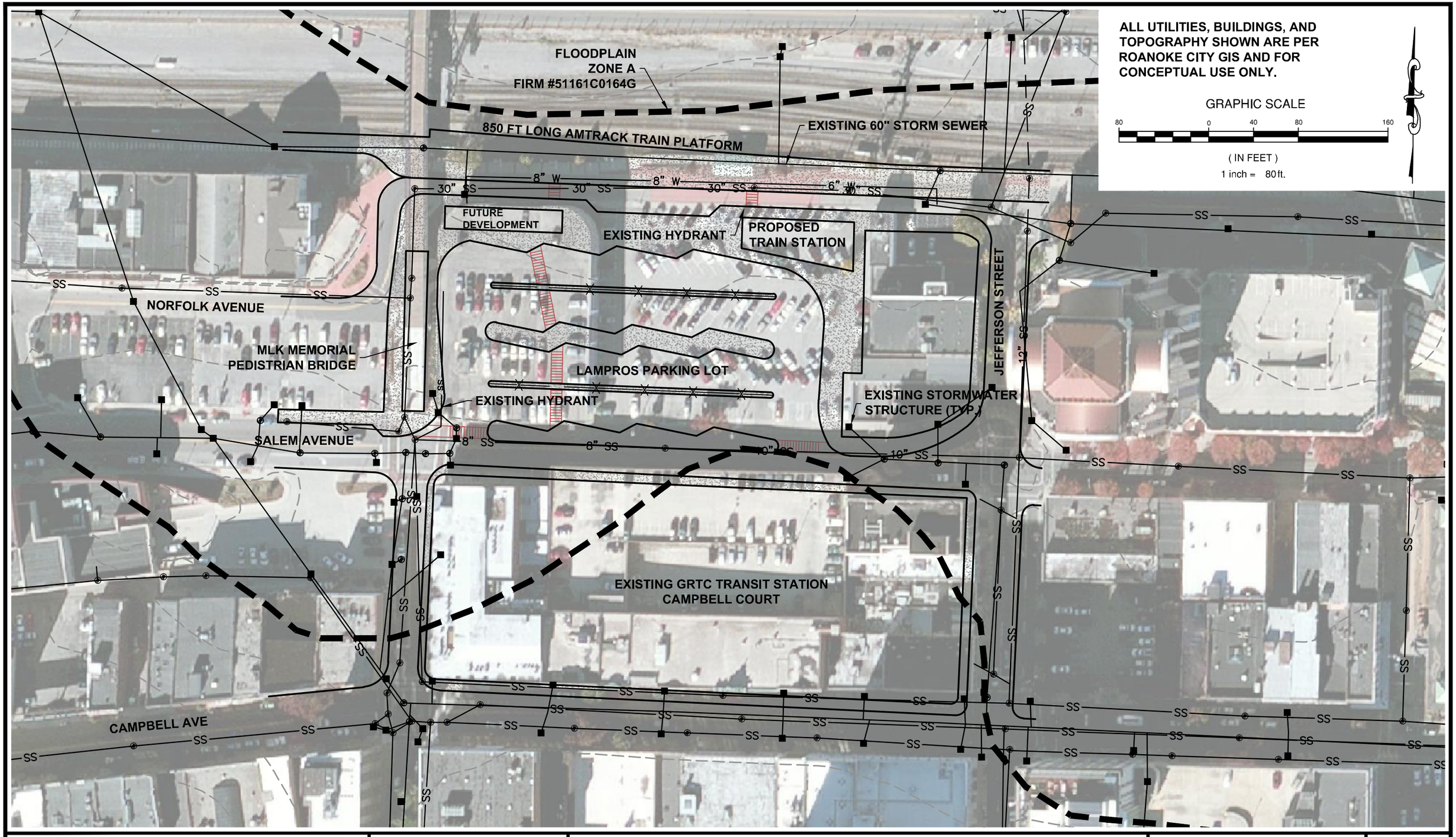
Task 3 - 10



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Task 3 - 11

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Coats, NC

DESIGNED: A/E
DRAWN: CEP
CHECKED: CAH
DATE: 04/17/2015

PHASE 2 SITE SKETCH
ROANOKE INTERMODAL TRANSIT FACILITIES

ROANOKE CITY, VIRGINIA

SCALE: 1" = 80'

PROJECT: B14134B-01

FIGURE
C-3

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET

50 0 150 300 METERS

PANEL 0164G

FIRM

FLOOD INSURANCE RATE MAP

ROANOKE COUNTY, VIRGINIA

AND INCORPORATED AREAS

PANEL 164 OF 310

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ROANOKE COUNTY	510190	0164	G
ROANOKE, CITY OF (INDEPENDENT CITY)	510130	0164	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
51161C0164G

MAP REVISED
SEPTEMBER 28, 2007

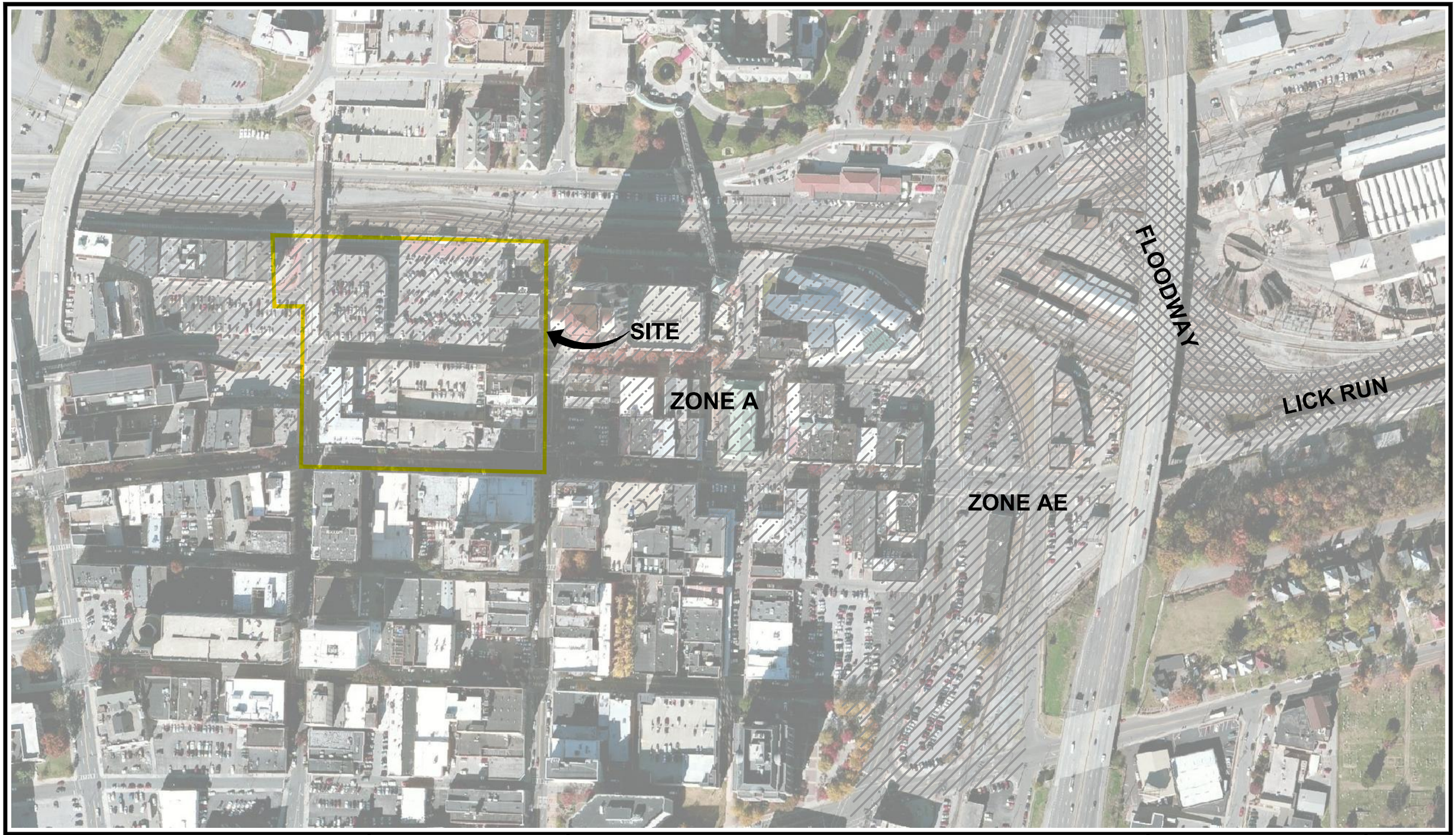
Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Task 3 - 12

FIGURE C-4A



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Hampton Roads, VA
Coats, NC

DESIGNED: CEP
DRAWN: CEP
CHECKED: CAH
DATE: 04/17/2015

FLOODPLAIN EXHIBIT
ROANOKE INTERMODAL TRANSIT FACILITIES
ROANOKE CITY, VIRGINIA

SCALE: 1" = 200'

PROJECT: B14134B-01

FIGURE
C-4B

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Conceptual Design

General Overview of Concepts

Following review of multiple sites near the planned train platform, it was determined to progress the design for Site 1 (see figure below). The design team examined the site to determine a safe and efficient layout that would meet the requirements of the facility program. The program for the entire project required a significant amount of space for both the facility and vehicle movements. The team first developed options that met the functional site requirements, but these options could not provide flexibility for GRTC to change operations in the future, which was requested in the initial program. Due to this issue, the team examined other site options that would accommodate the entire program and as well as provide the flexibility that would allow transit operations to be modified in the future.

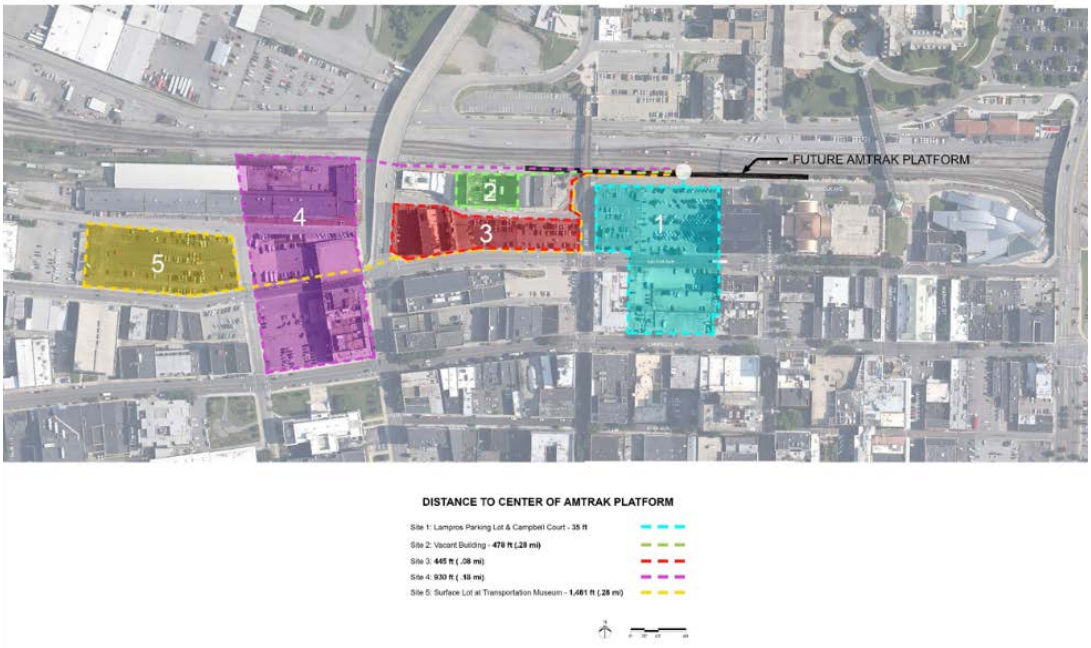


Figure 16: Study Area and Potential Parcels with Distance to Center of Amtrak Platform

The design team assessed two properties north of Salem Avenue, immediately north of the current facility at Campbell Court, and began looking at Master Plan opportunities for downtown Roanoke that could follow the intermodal development. These additional parcels ultimately provided alternatives that were visionary for the City of Roanoke, but were not anticipated in the initial design. Therefore, the design exercise became an opportunity to explore how the additional parcels would transform this area of the city into something that would change the community's perception of transit. Roanoke's intermodal facility will be transformational to the current transit experience and it will also add another chapter to the city's storied transit history.

Given the tremendous history and importance of transit to Roanoke, the design team sought to create a facility that would respect the past but also look to the future. The design also incorporates comments received from the public that stated the facility should contain inspired detailing and display craftsmanship that will contribute to the city's pride.

Initial Site Concepts

Two initial concepts were developed for discussion with the steering committee to review overall location, the method and purpose for combining bus with the train program, and different styles of bus circulation boarding and alighting. The following figures illustrate these two initial options.

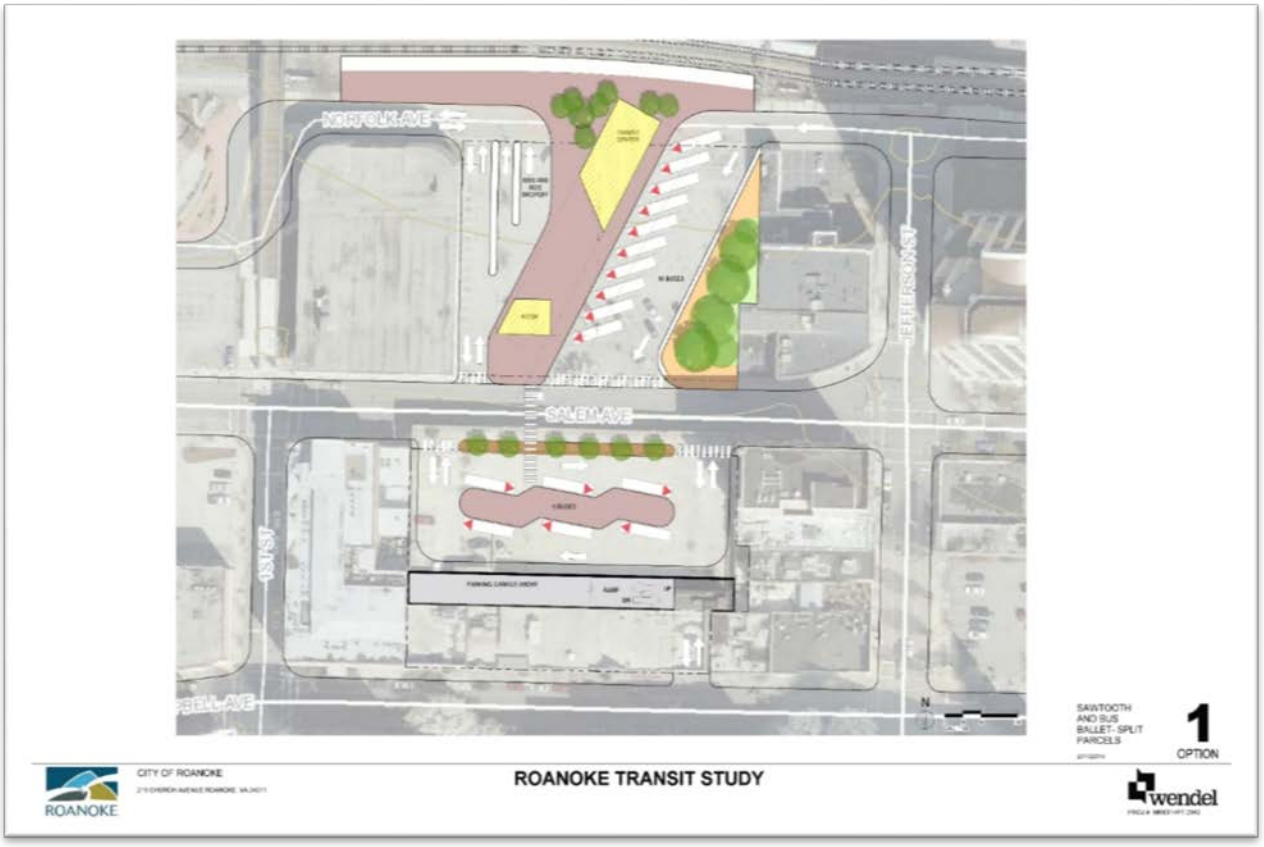


Figure 17: Site Plan Option 1

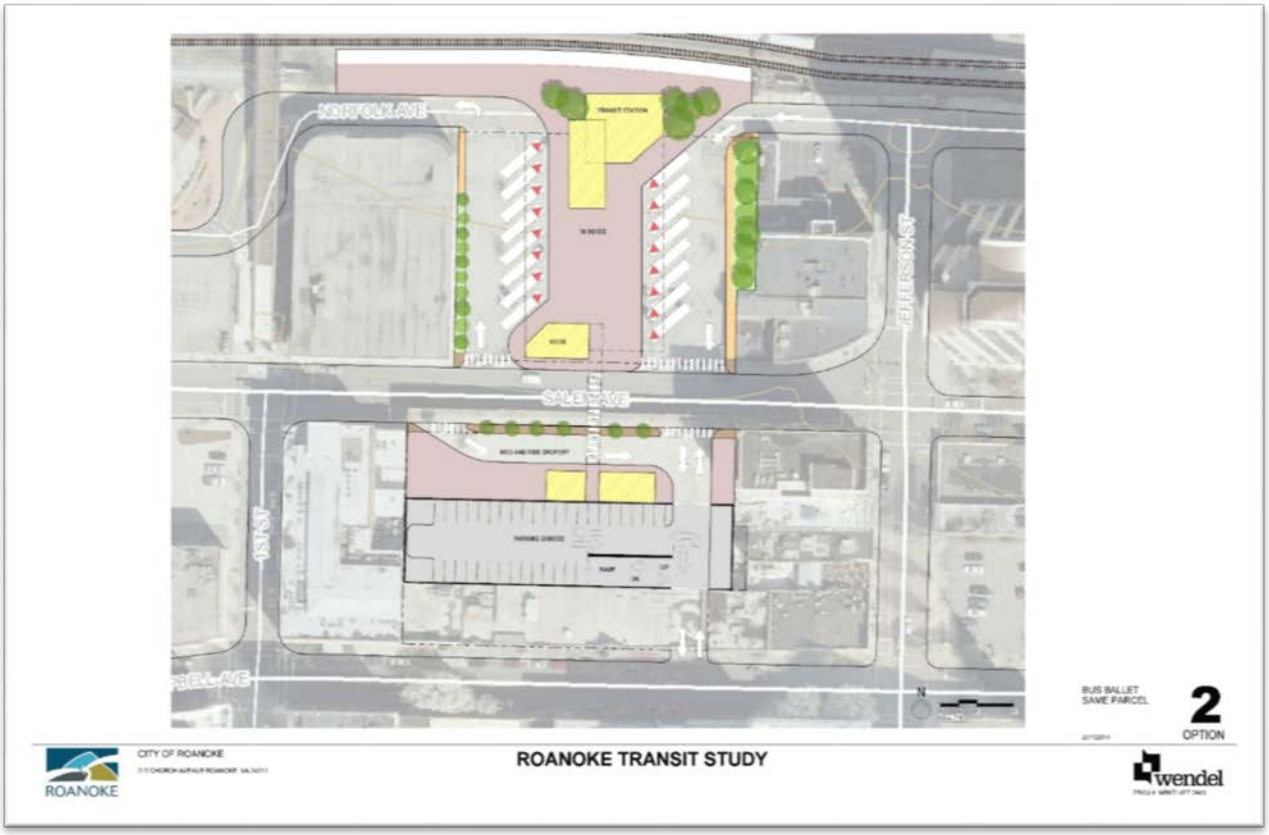


Figure 18: Site Plan Option 2

Initial Master Plan Site Concepts

After the kick off meeting, the design team began to look further at the programmatic space requirements and possible sites to develop the concepts. The primary guiding principles governing these concepts were to provide a sawtooth platform configuration for the GRTC buses and to return the existing Campbell Court transfer center to redevelopment with possible mitigation for the loss of parking.

The first concept (1a), which is more compact in nature, uses the Lampros Property and Merchants Parking Deck for the sawtooth bus platforms. The building for the transit station and possible mixed use development is located directly adjacent to and west of the MLK, Jr. Pedestrian Bridge. The second concept (2a) extends the sawtooth platform across the MLK, Jr. Pedestrian Bridge into the surface parking lot west of 1st street.

Both plan concepts would meet the space program requirements and allow for transit oriented development to support the train and transit services. Both concepts provide space for Greyhound and the SmartWay bus service from Blacksburg, as well as other regional transit components.

Figure 19: Master Plan Option 1a

Figure 20: Master Plan Option 2a

Refined Site Concepts

After the steering committee's review of the initial conceptual site and master plan designs, the design team learned of the constraints of the site and refined the design to accommodate these. The first constraint was that the MLK, Jr. Pedestrian Bridge should be considered historic and no alteration would be allowed to its current form. Secondly, Norfolk Avenue would be reduced to a one lane street for east bound traffic once the train platform is in place. Thirdly, Salem Avenue should remain a two-way street.

With these constraints, the design team developed site layouts for the area between 1st and Jefferson streets and the future Amtrak platform and Campbell Avenue, including Salem Avenue. The following are the five concepts that were developed. Each concept accounted for the entire program of space required North of Salem Avenue and included the reuse of Campbell Court for parking and other compatible uses.

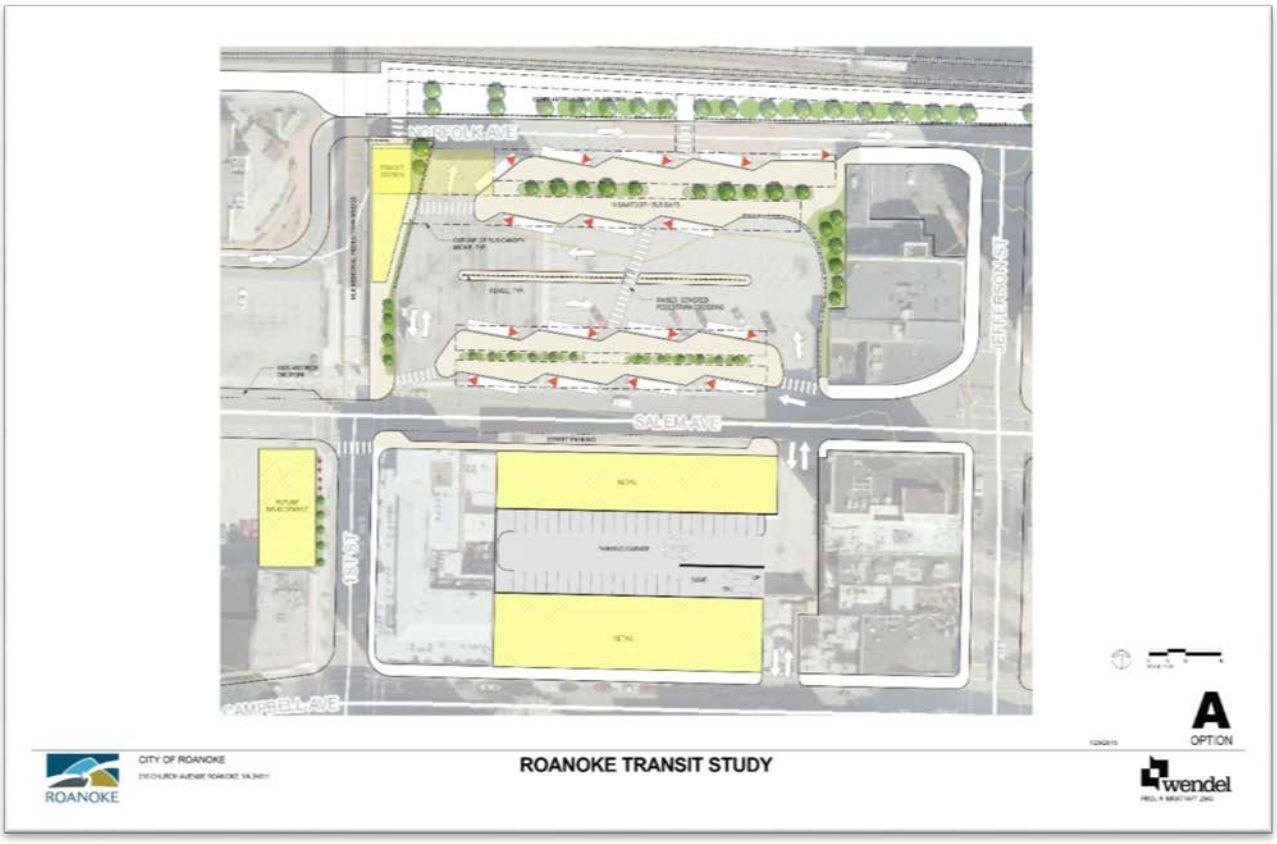


Figure 21: Master Plan Option A

- Sawtooth bus bay configuration for sixteen (16) buses, preferred because of bus operations flexibility.
- The wide platforms allow for vegetated public areas, especially for transit users.
- Bus bays are located along both Salem Avenue and Norfolk Avenue.
- The transit center is located in the northwest corner of the site, allowing for connection to the MLK Jr. Memorial Bridge for enhanced pedestrian circulation.
- Opportunities exist for the Transit Center to span over top of a portion of the bus circulation.
- A kiss and ride is located on Salem Avenue, west of the Memorial Bridge.

Figure 22: Master Plan Option B

- Sawtooth bus bay configuration for sixteen (16) buses, preferred because of bus operations flexibility.
- The narrow platforms allow for shorter pedestrian crossings from one platform to another.
- Bus bays exist along Salem Avenue and Norfolk Avenue.
- The transit center is located along the majority of the west side of the site, allowing for connection to the MLK Jr. Memorial Bridge for enhanced pedestrian circulation.
- The building's location gives a strong street presence to the transit center and possible future development along both Norfolk Avenue and Salem Avenue.
- A kiss and ride is located on Salem Avenue, west of the Memorial Bridge.

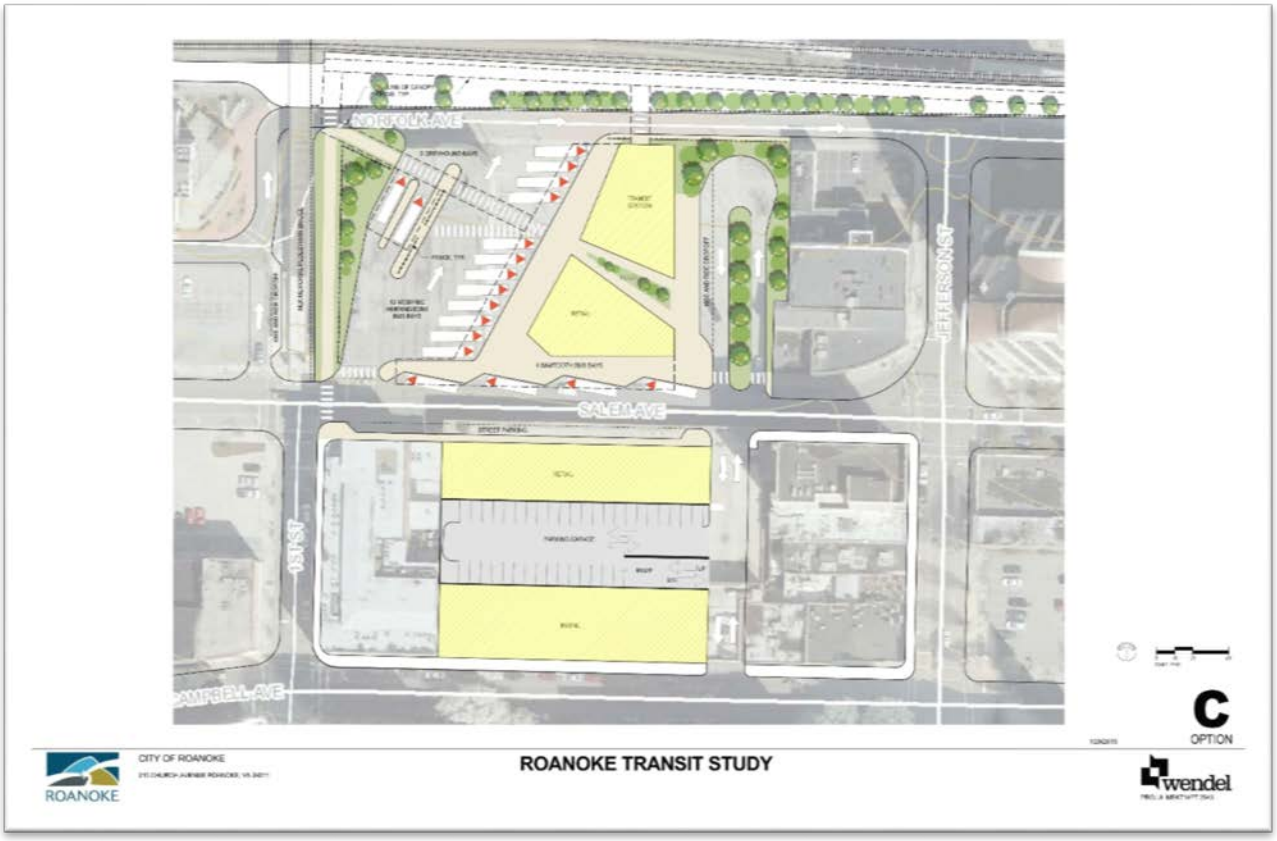


Figure 23: Master Plan Option C

- This option provides a Modified Herringbone bus bay configuration for twelve (12) bays. There are also four (4) sawtooth bays along Salem Avenue and an additional two (2) pull-through bays for regional service.
- The transit center is located centrally within the site, producing a single central platform, with the exception of the regional service bays. Generally, this allows for shorter pedestrian transfer times.
- Vegetated public spaces exist throughout the site for transit users, employees, and the public.
- The building's location gives a strong street presence to the transit center and possible future development along both Norfolk Ave. and Salem Ave.
- There is a kiss and ride on Norfolk Avenue, west of the pedestrian bridge.

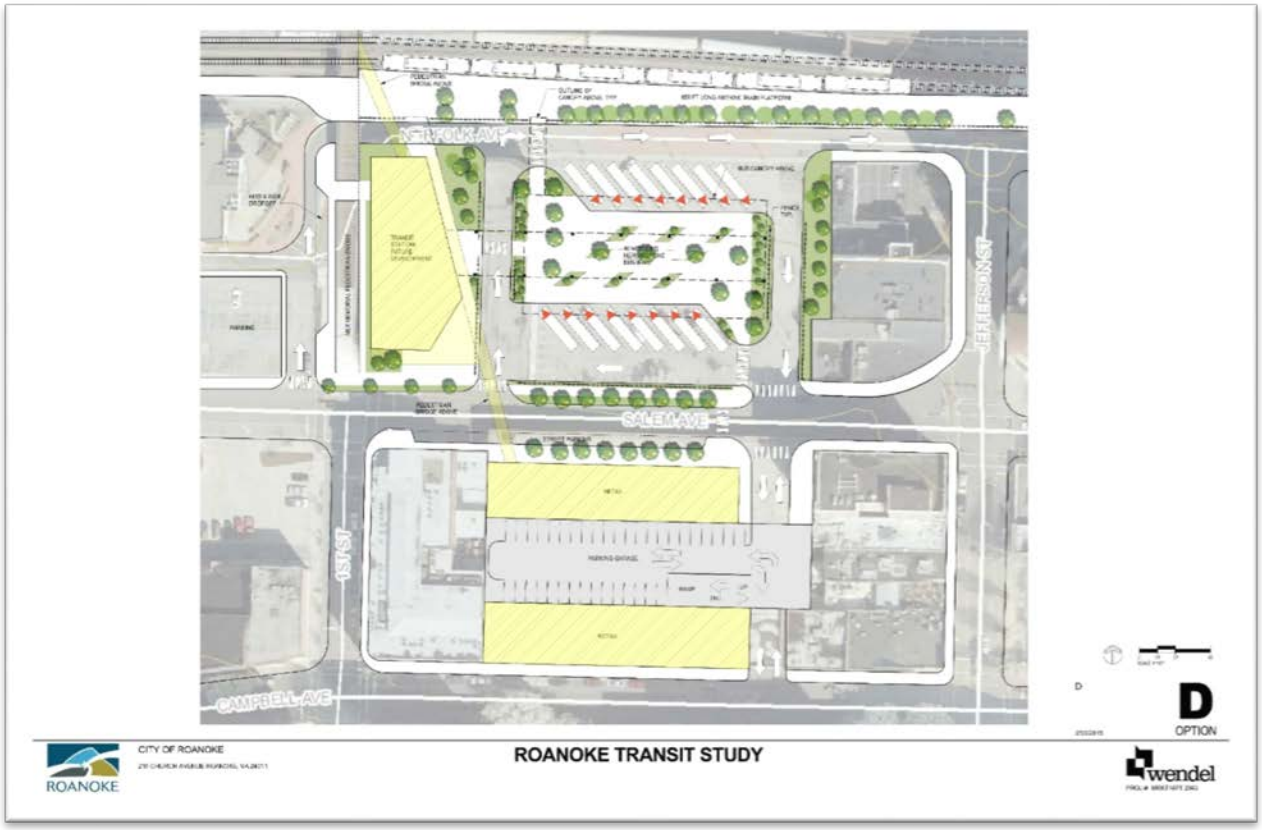


Figure 24: Master Plan Option D

- This option provides a Modified Herringbone bus bay configuration for sixteen (16), allowing for a condensed site layout and lower square footage requirements for bus circulation.
- A single central platform, allows for shorter pedestrian transfer times and a vegetated public space for transit users, employees, and the public.
- The transit center is located along the majority of the west side of the site, allowing for connection to the MLK Jr. Memorial Bridge and proposed parking garage at Campbell Court, for enhanced pedestrian circulation.
- The building's location gives a strong street presence to the transit center and possible future development along both Norfolk Avenue and Salem Avenue.
- There is a kiss and ride on Norfolk Avenue, west of the pedestrian bridge.

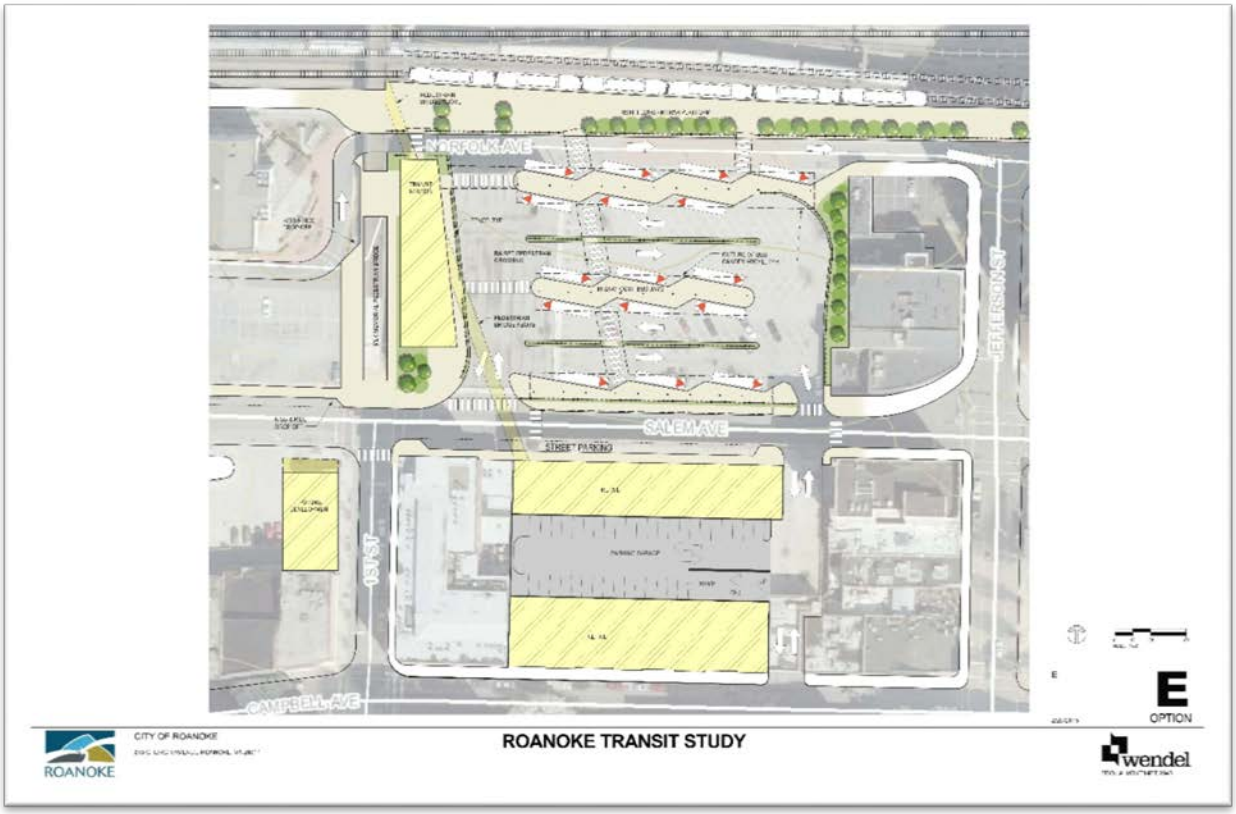


Figure 25: Master Plan Option E

- Sawtooth bus bay configuration for sixteen (16) buses, preferred because of bus operations flexibility.
- The narrow platforms allow for shorter pedestrian crossings from one platform to another.
- Bus bays exist along Norfolk Avenue, but not along Salem Avenue, allowing for a safe and possibly canopy-covered pedestrian experience.
- The transit center is located along the majority of the west side of the site, allowing for connection to the MLK Jr. Memorial Bridge and proposed parking garage at Campbell Court, for enhanced pedestrian circulation.
- The building's location gives a strong street presence to the transit center and possible future development along both Norfolk Avenue and Salem Avenue.
- There is a kiss and ride on Salem Avenue, west of the Memorial Bridge and another on Norfolk Avenue, west of the pedestrian bridge.

Preferred Site Concepts

Following the review and evaluation of the five site plans, D and E proved to be the preferred options of City officials and Valley Metro staff. The two plans were selected because both allow for the transit center to be developed in conjunction with future development opportunities. Both create a safe pedestrian experience along Salem Avenue in addition to safe pedestrian and bus circulation throughout the entire site. Options D and E were both refined and developed three-dimensionally so that the committee could begin to visualize the possibilities for the intermodal center and future development on this site.

After presenting the further developed concepts to the city, Option E was selected as the preferred option. In addition to the development opportunities mentioned above, Option E was also determined to be the preferred option in terms of transit operations. The sawtooth bus bay configuration in the preferred option gives much greater flexibility to Valley Metro in terms of bus service and operations. In this configuration, the operator has flexibility to schedule the buses to depart at various times and not have to rely on pulse scheduling. This will allow for immediate service flexibility as well as the opportunity to alter service and operations in the future. Bus slips are able to remain off of Salem Avenue, unlike other options, and Norfolk Avenue is also able to remain open in the desired eastbound direction.

Phased Site Development

The design team then explored options that would allow for phased project development. A phased development approach would provide the city with a temporary Amtrak Station on a portion of the preferred site or a retrofit of an existing building nearby. The team developed four (4) phased options, F, G, H, & I (Eye), under the assumption that a temporary Amtrak Station could first be located adjacent to or in a corner of the existing Lampros' Parking Lot. Option F shows the retrofit of an adjacent building for Phase 1 with the preferred site option (previously Option E) for Phase 2. Options G, H, & I all show a temporary Amtrak Station in the north east corner of the Lampros' Parking Lot for Phase 1, and new site options for the transition to Phase 2. These three options allow the bus bays to be constructed without disrupting a waiting area for Amtrak service. The permanent transit building and requested programmatic elements would later be constructed in the same location, to replace the temporary station.

Phased Concepts for Preferred Site

Figure 26: Option F, Phase 1

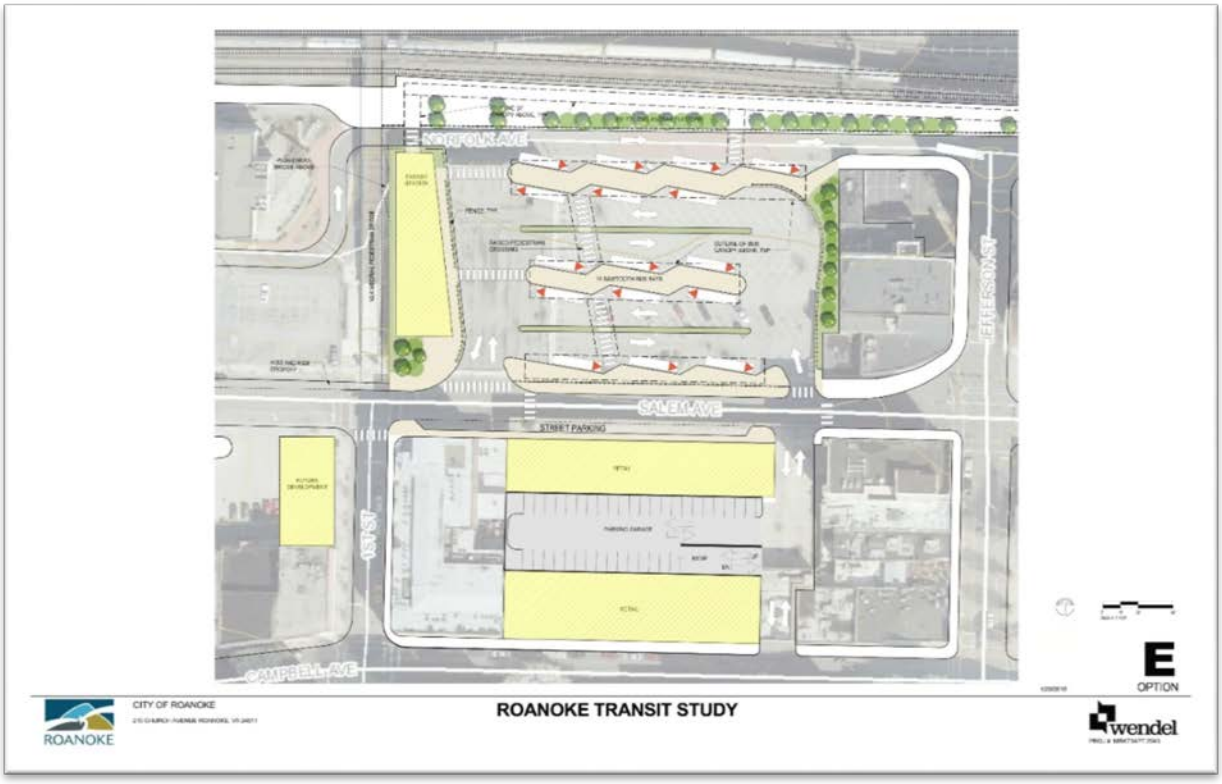


Figure 27: Option F, Phase 2

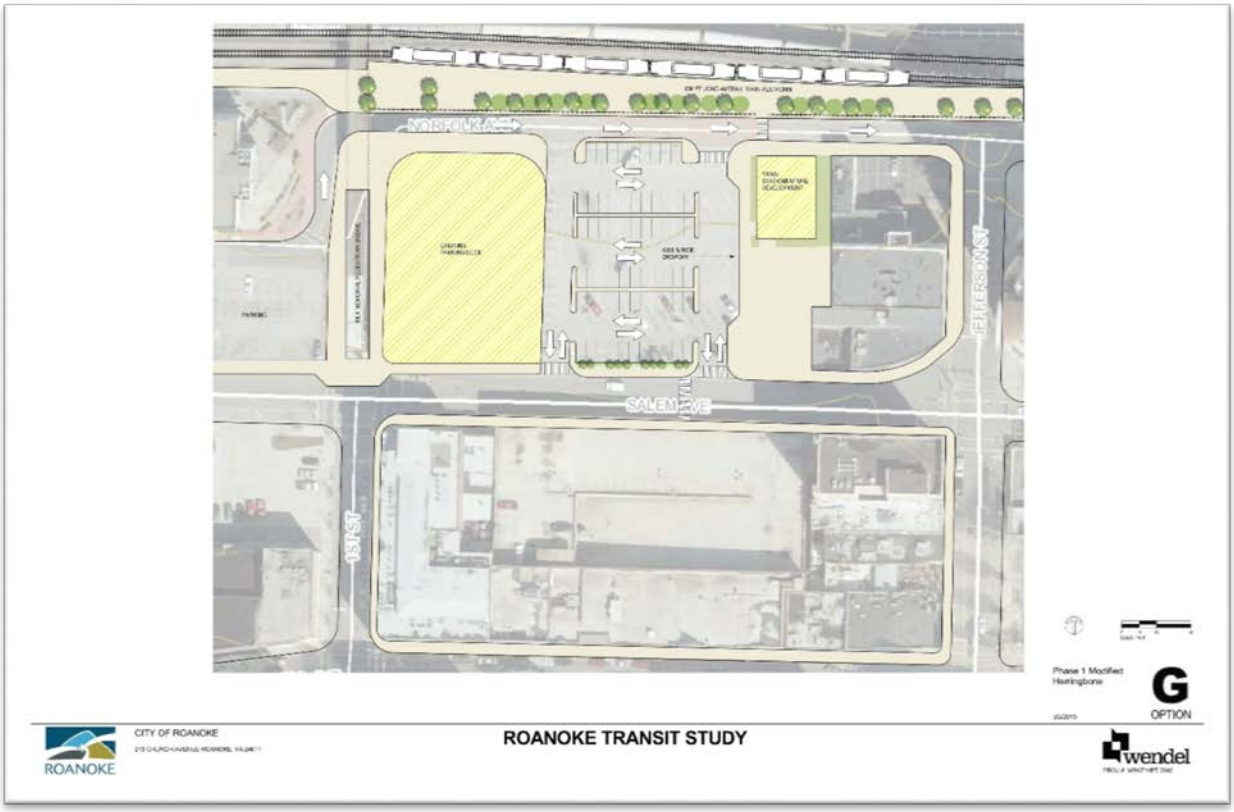


Figure 28: Option G, Phase 1

Figure 29: Option G, Phase 2

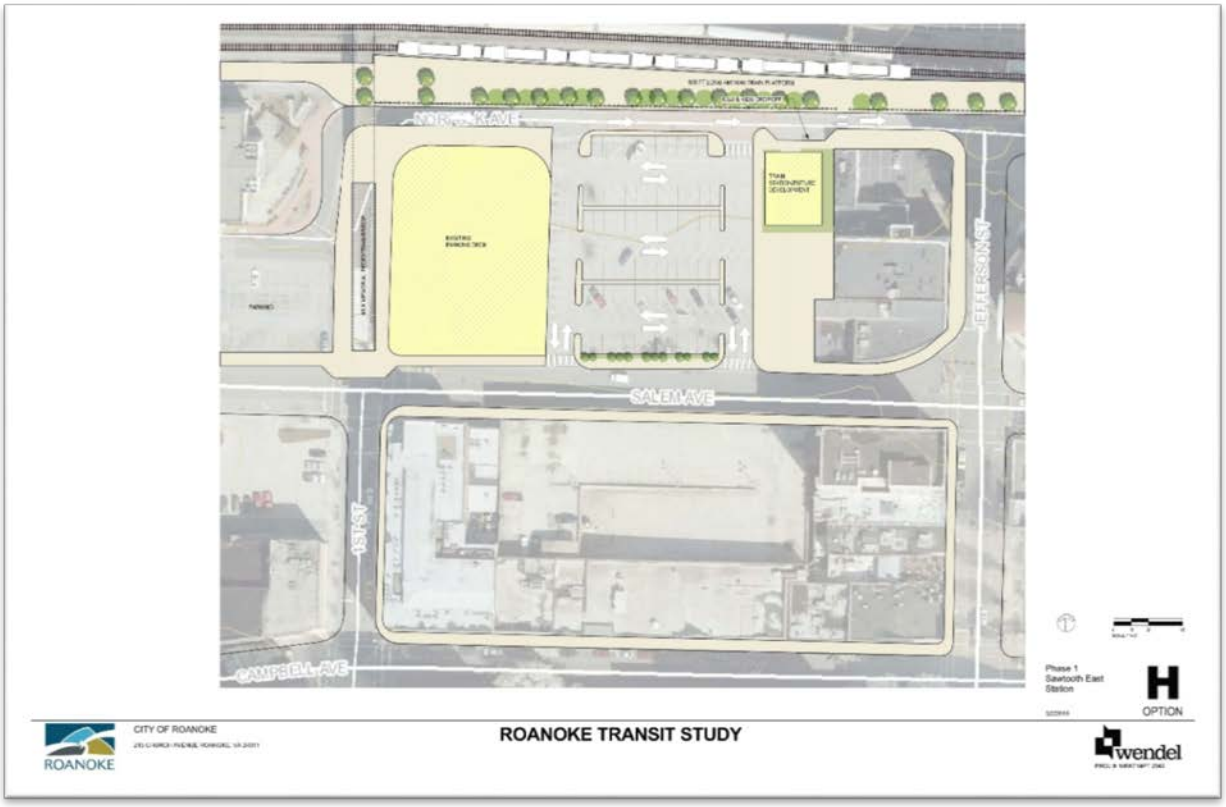


Figure 30: Option H, Phase 1

Figure 31: Option H, Phase 2

Figure 32: Option I, Phase 1

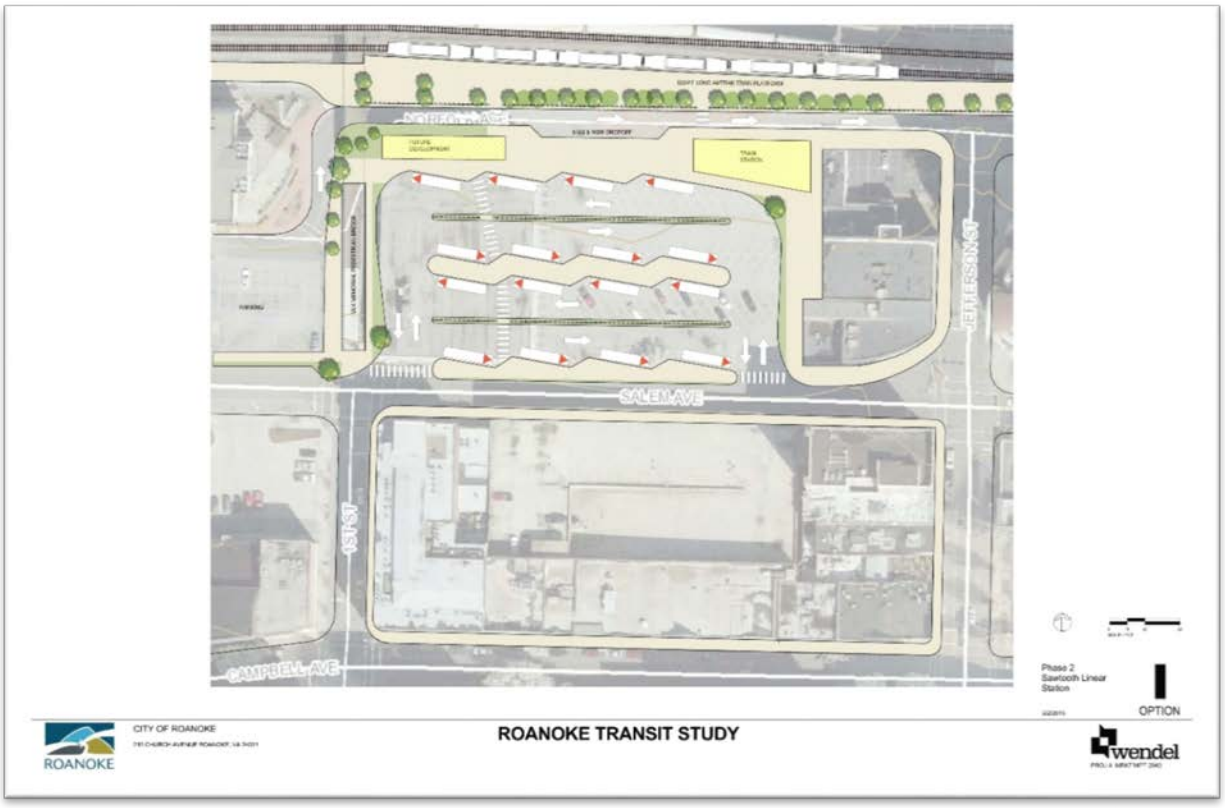


Figure 33: Option I, Phase 2

Three Dimensional Study for Option I (Eye), Phase 2

Option I separates the train platform from the bus loading stations by locating a shared facility between the two venues. The bus activity is ongoing throughout the day, while the train platform activity is limited. This design allows for changes in future platform use. The facility itself (the station) is positioned such that it will permit access directly from the Martin Luther King Bridge (MLK Bridge), elevating and paying homage by connecting this hub of activity to the Gainesboro community, recognizing its importance to Roanoke. The bridge also connects the site to the Gainesboro parking garage to the north. From the south, a canopy extends from Salem Avenue across the bus "park" to the station, and across Norfolk Avenue to the train platform.

Train stations have a history of creating a strong presence of place and contributing aesthetic qualities within their community. The design of Option I seeks to provide a unique and significant experience. It acknowledges that for those using public transportation, the intermodal station is the first and last thing they may experience while visiting Roanoke, and for those residing in Roanoke as they enter and leave the downtown area.

The design of the station is intended to create a rich visual experience – even for those that may not get off at the station. The shape of the station is influenced by the buildable area left between the saw-tooth bus layout and Norfolk Avenue. The architecture metaphorically represents a train, with the eastern most section being the "engine." The engine is the most visible, inviting and transparent portion of the structure. The ticket counter and waiting is housed within the "engine," enabling passengers to view incoming and departing traffic. The transparency between inside and outside lends an air of spaciousness, while also giving natural light.

Adjoined to the engine are three "box-cars." On the lower level, the box-cars provide ticketing, baggage claims, customer service and security functions. The upper level includes Amtrak and GRTC offices, as well as overnight accommodation for Amtrak.

The bus platform area is envisioned to be an open and artistic landscape that yields an uncluttered and transparent experience that is more park-like, bringing light and life to the space, as well as a sense of security. The materials, site layout and visual elements reinforce these ideas by providing artistic elements that will add to the urban fabric of Roanoke.

The bus platforms include canopy structures that are made of two parts: The lower canopies provide protection to pedestrians waiting, but are also designed to mitigate storm water issues through the use of green roofs. The green roofs provide an enhanced aesthetic value for neighboring buildings that look down over the terminal. The taller tensile structure fabric canopies provide protection while entering and exiting the buses. At the same time, these reduce the heat island effect while offering light transmittance to people and plantings below.

The patterned surface of the vehicular driving lanes respond to traffic patterns for each bus. The design and materials for pavement breaks up the monotony of the expansive surface through varied texture and color. These patterns also assist in directing passengers to walk in a particular area. A perforated metal divider runs between each of the bus driving lanes, placed to control and limit pedestrian traffic. At night, these illuminated barriers are lit from below, adding to the landscape experience.

Finally, the design allows GRTC to move away from using the pulse system for their bus operations. Beyond addressing the basic aspects of public transportation, the design seeks to create civic value through its aesthetic qualities and the incorporation of features such as reduced heat island effect, effective storm water management, and by creating an important hub of activity within downtown Roanoke.

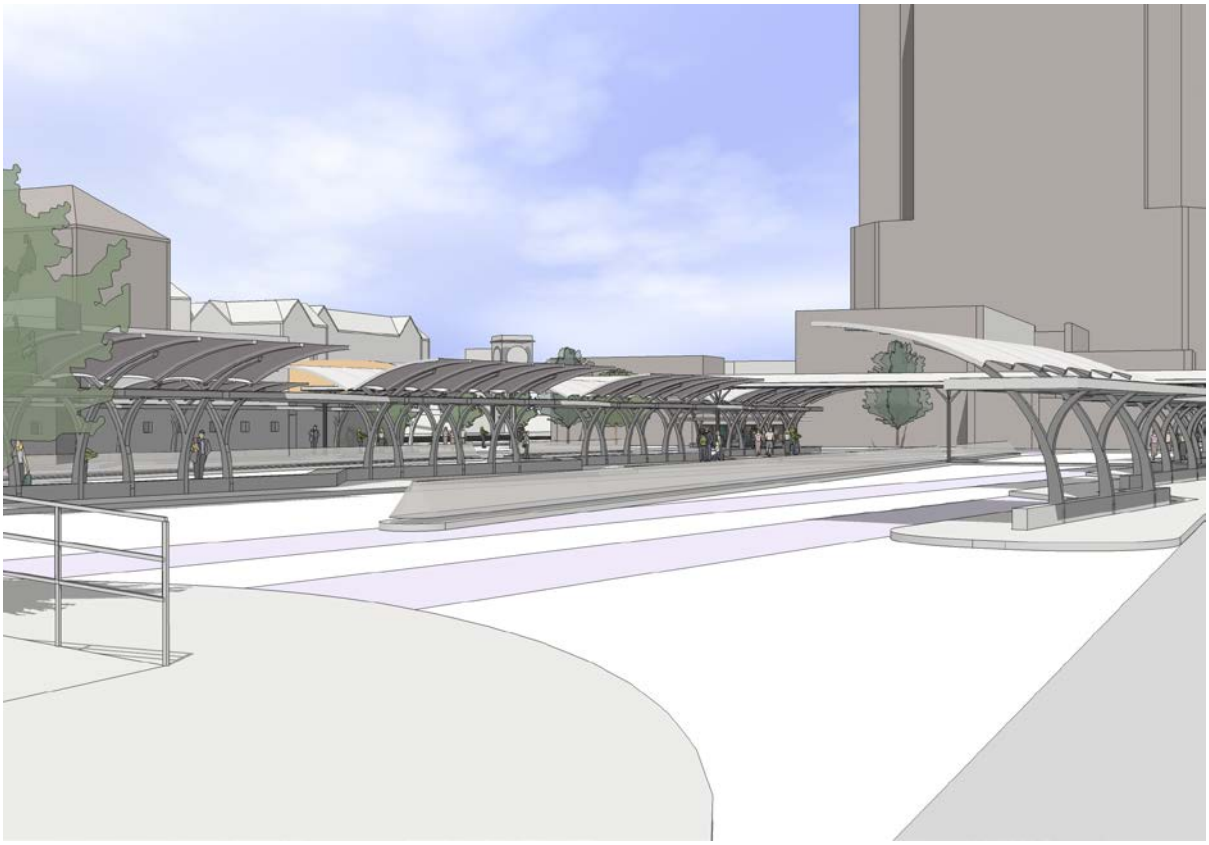


Figure 34: View looking north east along Salem Avenue

Figure 35: Bird's eye view looking east over the entire site

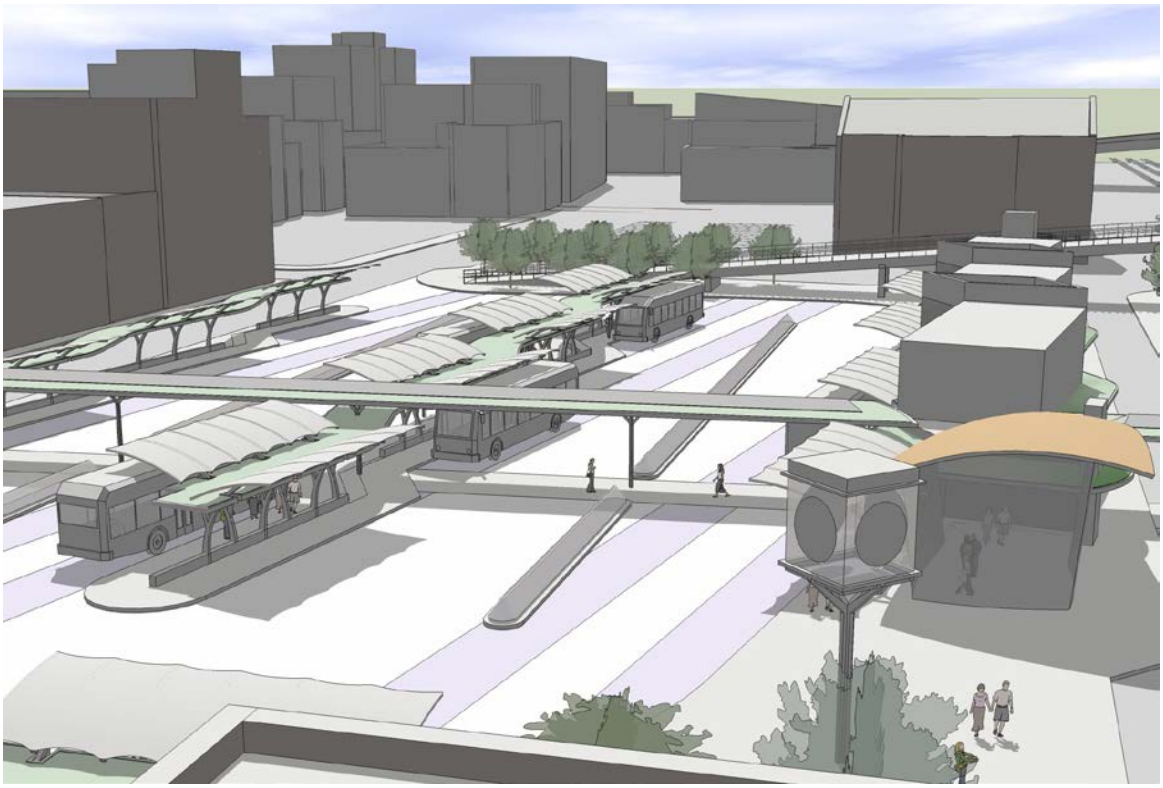


Figure 36: Bird's eye view looking west over the entire site

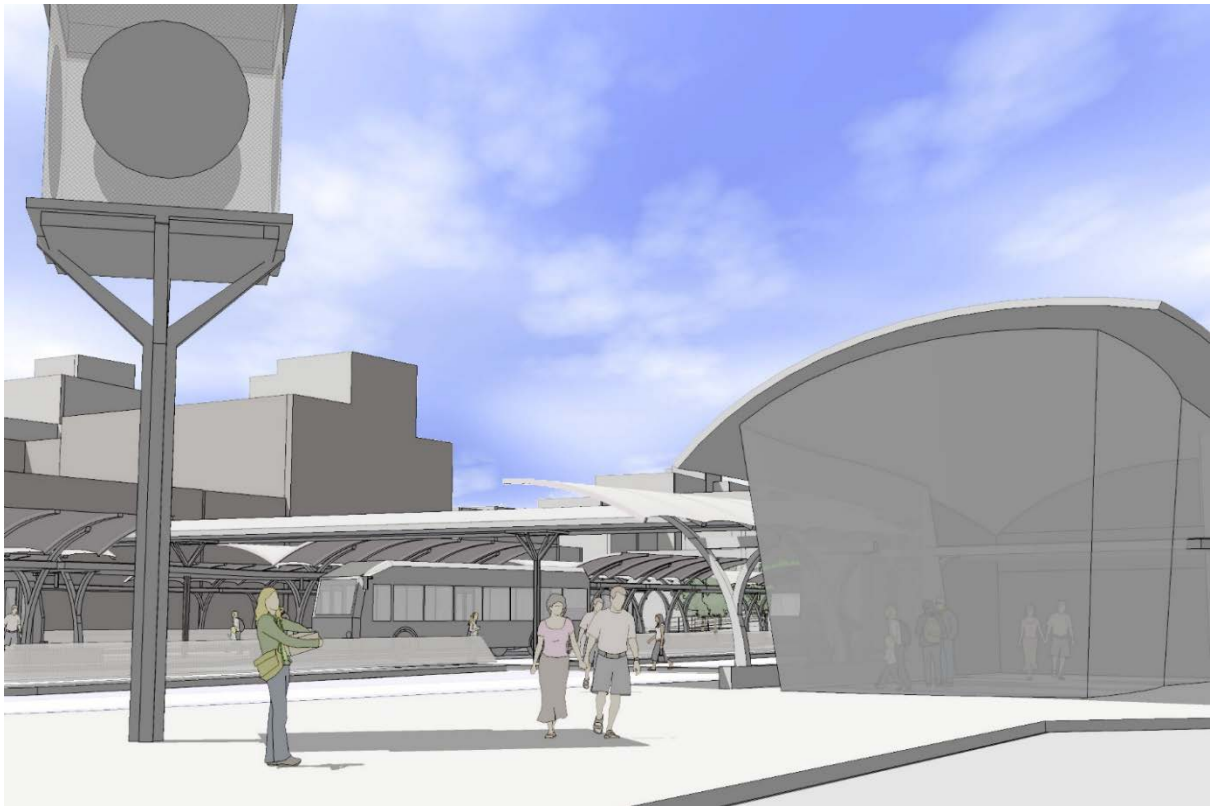


Figure 37: View looking south west at transit center, from train platform

Three Dimensional Study for Preferred Option

The design incorporates many goals, but connectivity is the term that inspired the entire project. Not only would the facility connect multiple modes of transportation, train, car, taxi, intercity bus and intra-city buses, but it would also begin to connect the city fabric. The first integral piece of the project is the location of the building adjacent to the Martin Luther King pedestrian bridge. The facility will be connected to the pedestrian bridge in a manner that is respectful of its design and that encourages transit users to utilize the neighborhood and parking facility across the rail tracks by providing a quick and easy connection to the new station. This connection to the bridge would be done with the utmost care so that the connection would not affect the historic quality of the bridge (Figure 45). This connection would lead through the transit facility and would then extend to the re-envisioned retail/commercial/parking facility in the location of the current transit facility at Campbell Court (Figure 41). This new facility would be woven back into the city fabric and help strengthen the pedestrian experience along Campbell Avenue (Figure 42).

The facades of the preferred option are carefully designed to blend with the city's architecture and integrate with the neighborhood. The west façade which is adjacent to the Martin Luther King Jr. Bridge and historic structures just west of the bridge, is designed to have an industrial appearance with brick detailing that is inspired by multiple facilities in the city (Figure 39). The east façade which faces the transit area is both classic and modern, providing the arriving train and bus passengers with an understanding of the historic past of the city while incorporating a modern element to represent the progress in the city (Figure 41). The north and south facades of the facility incorporate the detailed brick craftsmanship that is highlighted on the west façade and provide defined entrances into the transit center (Figures 40 and 45).

The transfer platform design is inspired by historic train canopies; however, they also have a modern influence (Figure 42). The canopies provide ample cover from the elements and maintain a bright and open appearance to create an urban plaza experience for the pedestrian (Figure 44). These canopies integrate into the pedestrian experience along Salem Avenue and are carried across the street to the new commercial facility establishing an integrated street experience (Figures 39, 42, and 43).

The entire facility will create a multi-modal transit center that will serve the city's present and future needs and also help to reestablish the pedestrian-transit relationship that was once a significant experience throughout Roanoke. Significant to the economic development of the city, this facility seeks to be the catalyst for adjacent development as has previously occurred in Savannah, Georgia and Petersburg, Virginia.

Figure 38: Preferred Option

Figure 39: View looking east along Salem Avenue

Figure 40 - View looking west along Salem Avenue

Figure 41- View from the new commercial facility.

Figure 42- View looking west along Salem Avenue

Figure 43- View looking west along Salem Avenue

Figure 44 - Birds-eye view looking along the train platform

Figure 45- View from the Martin Luther King Jr. pedestrian bridge

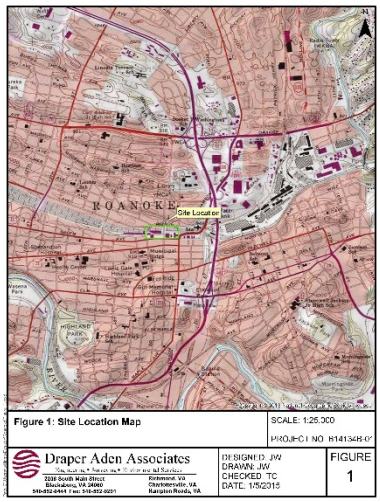
Figure 46- Birds-eye view of the transit facility

NEPA Analysis and Documentation

NEPA Overview

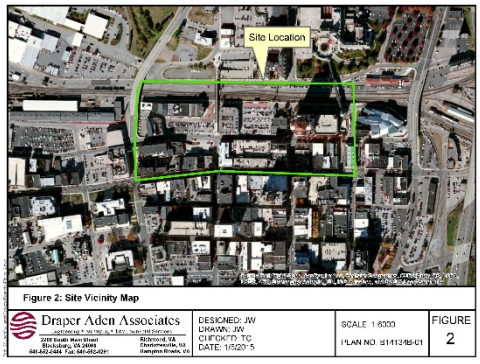
In task 5, a National Environmental Policy Act (NEPA) study was undertaken as required by federal agencies for receipt and use of federal funds. There are three (3) levels of study that NEPA reviews may fall under. For this project, a Categorical Exclusion (CATEX), the minimal of all studies was required to document any environmental effects and potential mitigation measures to address those.

On behalf of the City of Roanoke, and as part of the Wendel project team, Draper Aden Associates completed a Categorical Exclusion and Documented Categorical Exclusion Worksheet (CATEX) for a proposed project in downtown Roanoke (Proposed Action). The Proposed Action for the Categorical exclusion was defined as the development of a Passenger Rail and Transit Intermodal facility in Downtown Roanoke.



Federal funding likely will be sought for these transportation-related project elements; therefore, the Proposed Action is subject to the regulations and guidance established by National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 et seq.). Projects or actions which do not have significant effects on the human and natural environment may be categorically excluded from certain documentation requirements of NEPA. Categorical Exclusions as defined in 23 CFR 771.118 include actions which do not induce significant impacts to planned growth or land use for an area, do not require the relocation of significant numbers of people, and do not involve significant impacts to any natural, cultural, recreational, historic, community or other resource. Furthermore, the action must not have significant impacts to air, noise, or water quality or have a significant impact on existing travel patterns. An action that qualifies as a Categorical Exclusion does not require the preparation of an environmental assessment (EA) or environmental impact statement (EIS) (i.e., it is categorically excluded from the need for such documentation).

The Proposed Action does not qualify as an Automatic CE or a PCE. Results of technical studies and resource analyses that were prepared clearly demonstrate the Proposed Action will not have significant environmental impacts.



The purpose of the Proposed Action is to increase access to public transportation and encourage its use through the construction of a new passenger rail and transit intermodal facility to support the reintroduction of passenger rail service in Roanoke, a service that ceased in 1979. The Proposed Action will build upon the ongoing construction of the commercial Amtrak rail facility platform currently under development by Norfolk Southern, Amtrak, City of Roanoke and the Commonwealth of Virginia, in the general vicinity of the Proposed Action, allowing a shared infrastructure benefit for the City of Roanoke and GRTC. Other potential collocated facilities include an updated GRTC bus station and adequate space to support bike sharing and taxi parking areas. The Proposed Action will serve existing and future commuter demand along the Heartland Rail Corridor of the Norfolk Southern

Railroad and help reduce traffic congestion along U.S. Interstate 81, one of the most congested Interstate corridors with regards to commercial traffic, in the U.S.

Amtrak intends to utilize the Proposed Action of reintroducing passenger rail service in order to provide efficient and convenient transportation to and from the Washington D.C. Mero Area. The intermodal facility will also support the use of mass transit by encouraging bus, taxi, and bicycle access from residential and commercial portions of the City to the proposed intermodal facility. This will allow mass transit access to the Washington D.C. Metro Area as well as points along the way and access to Union Station, one of the largest train stations in the nation, thereby providing access to locations nationwide. This Proposed Action supports multiple transportation initiatives including the Heartland Corridor Initiative, an ongoing rail improvement project of "national significance". The construction of the Proposed Action will serve the existing and future regional demand for commuter rail service. Additionally, the Proposed Action will help provide updated facilities to support the GRTC bus transit operations.

The Proposed Action will also decrease vehicle miles traveled regionally and along the U.S. Interstate 81 corridor in particular, which supports the stated goals and policies in state and regional planning documents. As recent studies have shown, severe traffic congestion exists throughout the region and on U.S. Interstate 81. Without the Proposed Action, drivers to and from the Roanoke Region will exacerbate these transportation problems. Based on a traffic estimated ridership, daily traffic volumes in the region will be lower with the Proposed Action as commuters will be able to travel shorter distances to the new commuter rail stop in Roanoke.

Existing Conditions

The proposed project area currently consists of mixed use commercial, industrial, and residential structures. The project area is located adjacent to the existing Norfolk Southern railway and is largely covered with impervious surfaces. Current uses include large parking lots, parking garage, bus station facility, residential apartment buildings, retail store front property, restaurants and light industrial operations.

Criteria Required for Documented Categorical Exclusion

The CATEX documents the following natural, cultural, and community resources and issue areas required by NEPA for the Proposed Action:

- Traffic, Transportation and Parking;
- Land Acquisition and Displacements;
- Land Use and Zoning;
- Air Quality;
- Noise;
- Cultural and Natural Resources;
- Visual/Aesthetics;
- Public Safety and Security;
- Ecologically Sensitive Areas and Endangered Species;
- Wetlands;
- Water Resources/Water Quality;
- Floodplains;
- Wild and Scenic Rivers, Navigable Waterways, and Coastal Resources;
- Farmlands;
- Socioeconomics;
- Environmental Justice (EJ);
- Environmental Risk Sites and Hazardous Materials;

- Seismic;
- Property Acquisition;
- Construction Impacts; and
- Indirect and Cumulative Impacts.

Conclusion of NEPA Process

Based on a review of environmental components and evaluation of impacts associated with the City of Roanoke's implementation of the proposed action, no significant direct, indirect, or cumulative impact on the human or natural environment is anticipated. The existing management and control systems combined with implementation in compliance with existing environmental regulations and best management practices (BMPs) would mitigate potential impacts associated with the new passenger rail and transit intermodal facility. It should be noted that Draper Aden Associates was unable to determine the potential for negative impacts to historical resources at this time given the preliminary nature of this project. This information will need to be further evaluated as additional details are available via official consultation with Virginia Department of Historic Resources (VDHR) to be initiated by FTA.

The full Categorical Exclusion and Documented Categorical Exclusion Worksheet are located in Appendix B of this report.

Economic Benefits Analysis

Economic Analysis

The economic impact of the intermodal facility project will be realized in two phases: (1) initial capital investment, which provides a one-time impact during the construction period, and (2) intermodal facility operations, which include the operations of Amtrak and bus services after the project is completed as well as commercial developments at the station. For both phases, the direct, indirect, and induced impacts in spending and job creation were estimated.

The initial investment would generate a sizable economic impact in the City of Roanoke. From 2016 to 2017, initial investment activities would generate a total economic impact (including direct, indirect, and induced impacts) of $17.2 million that can support 114 cumulative jobs in the City of Roanoke. Among the total economic impact, $10.9 million is derived from direct spending during the project development phase of intermodal facility. This spending can directly support 59 cumulative jobs in the region from 2016 to 2017. The indirect impact in the region during the development phase is $4.1 million and 37 cumulative jobs from other industry support of the initial investment, such as equipment rental or truck transportation. The induced impact during the development phase is expected to be $2.2 million, which can support 17 cumulative jobs—these jobs are expected to be concentrated in consumer service-related industries such as restaurants, hospitals, and retail stores. The annual average economic impact (including direct, indirect, and induced impacts) of project development activities is estimated to be $8.6 million, which can support 57 jobs per year in the city from 2016 to 2017.

Figure 47:

Table 1: One-time Economic Impact from Roanoke MTC Development Activities

		Direct	Indirect	Induced	Total
Cumulative (2016-2017)	Spending ($Million)	$10.9	$4.1	$2.2	$17.2
	Employment	59	37	17	114
Annual Average (2016-2017)	Spending ($Million)	$5.5	$2.0	$1.1	$8.6
	Employment	30	18	9	57

Note: Numbers may not sum due to rounding

Source: Wendel and IMPLAN Pro 2013

The total annual operational impact (direct, indirect, and induced) of the Roanoke intermodal facility is estimated to be $14.3 million in 2018, which can support 59 jobs in the city. Among those, direct revenues from the intermodal facility operation, Amtrak operation, bus service, taxi service, and other retail and food establishments are estimated to be $9.8 million, which can support 48 jobs. The indirect impact is estimated to be $2.6 million and 6 jobs, benefiting other businesses within the city that support all businesses at intermodal facility. The induced impact is estimated to be $1.8 million and 5 jobs in the city, mostly benefiting consumer-related businesses such as retail shops, healthcare facilities, and restaurants.

Figure 48:

Table 3: Annual Economic Impact of Roanoke MTC Operation (2018)

		Direct	Indirect	Induced	Total Impact
Amtrak Operation	Spending ($Million)	$7.3	$1.9	$1.3	$10.5
	Employment	3	2	1	6
Bus Operation	Spending ($Million)	$0.6	$0.2	$0.1	$0.9
	Employment	3	1	0	4
Taxi Service	Spending ($Million)	$0.0	$0.0	$0.0	$0.1
	Employment	1	0	0	1
Facility Support	Spending ($Million)	$1.5	$0.4	$0.3	$2.1
	Employment	31	3	2	37
Retail and Food Service (including VA for Lovers Store)	Spending ($Million)	$0.5	$0.1	$0.1	$0.7
	Employment	10	1	1	11
Total	**Spending ($Million)**	**$9.8**	**$2.6**	**$1.8**	**$14.3**
	Employment	**48**	**6**	**5**	**59**

Note: Numbers may not sum due to rounding

Source: IMPLAN Pro 2013 and Chmura

There are three broad user benefits estimated in this study. The first is travel time savings from congestion mitigation. Though using bus or rail service may increase travel time for commuters or rail passengers, it reduces the number of vehicles on area roads which provides traffic congestion relief for many drivers. The second benefit is motor vehicle-related cost savings. Individuals using rail or bus services will reduce their usage of vehicles, thus saving money on operational costs. The third benefit is safety. Fewer vehicles on the road can reduce both accidents and accident-related injuries. The safety benefit also reduces inconveniences and costs involved with both minor and major car accidents. Though not quantified in this study, the resulting decrease in automobile usage can help reduce greenhouse gas emissions.

In summary, total user benefits are estimated to be $9.1 million per year if Amtrak services remain at the existing level in 2018.

The ongoing operation of the intermodal transportation facility can contribute $63,068 in taxes per year to the City of Roanoke government, and $177,377 in taxes to the state government in 2018.

Figure 49:

Table 6: Annual Tax Revenue From Roanoke Multimodal Transportation Center Operation (2018)

	City of Roanoke	State of Virginia
Sales Tax	$4,760	$20,467
Meals Tax	$23,799	
BPOL Tax	$34,479	
Individual Income Tax		$136,913
Corporate Income Tax		$19,996
Total Annual Taxes	**$63,038**	**$177,377**

Source: Chmura Economics & Analytics